Contractors and Engineers Monthly

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Highlights Of This Issue

Pennsylvania Turnpike

Next in our series of fourteen articles on this 160-mile super-highway are descriptions of the construction of the 5,904-foot Allegheny Tunnel, and the grading of Section 12A on which the contractor and subcontractors used a wide variety of methods and equipment.
See page 1.

New Trunk Sewer

The first of six sections of the new North Metropolitan Trunk Sewer to serve suburbs of Boston consisted of 4,710 feet of open-cut trench for the elliptical sewer, including a river crossing. The feature of another section, awarded to the same contractor, was the speed with which 600 feet of the sewer was constructed under a heavily-traveled parkway.
See page 2.

Concrete Plant for Texas Bridge

The feature of the construction of a 920-foot bridge over the Brazos River in Texas was the well-planned concreting set-up for the deep river and bank caissons for the bridge piers.
See page 2.

Excellent Roadside Work

The work of the winner of the North Atlantic Section Award in the 1939 Contractors and Engineers Monthly Roadside Development Awards included efficient salvaging of top soil, careful preservation of existing roadside vegetation, and particularly effective methods of sodding, as well as exceptional cooperation with the state highway engineers on a 2.03-mile relocation project in Maine.
See page 9.

Speedy Dual-Drum Paving Job

On a 7.63-mile concrete paving job in Wisconsin last summer, the contractor had his entire organization so attuned to the speed of his dual-drum paver that his crew uniformly maintained 200 feet an hour.
See page 11.

A Highway Prophet

A glimpse into 1960 and the kind of highways, designed for greater safety at higher speeds, which we may expect to find there is furnished by a modern Jules Verne.
See page 16.

IN THIS ISSUE

Driving Allegheny Tunnel, And Grading One Section Of Pennsylvania Turnpike

Allegheny Tunnel Headings Driven First with Bench, Then to Full Face by the Guthrie-Marsch-Peterson Co.

✦ ALLEGHENY Tunnel on the Turnpike west of New Baltimore, Pa., is a new tunnel, eliminating one of the old South Penn tunnels because of a change in line. The tunnel proper is 5,904 feet in length, while Contract 17, Section A2, for the tunnel and east and west approaches is 9,816 feet long. This contract was awarded to Guthrie-Marsch-Peterson Co. of Chicago, Ill., on May 12, 1939, on its low bid of $2,672,188.40 for completion within 315 calendar days, and involves 165,000 cubic yards of tunnel excavation alone.

The contractor's original construction road to the east portal took off from an obscure township road and then crossed a deep ravine to the site of the portal. As heavy equipment could not be brought in over this road, a new well-maintained hard-surfaced road of "red dog" was built for 2.5 miles from State Highway 31. Access to the west portal, however, was readily gained by a short run from Highway 31 at a point some 3 miles distant from the junction of the other access roads.

Located high on a rock shelf on the east side of Allegheny Mountain, the contractor erected a group of galvanized

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C. & E. M. Photo

Removing a rock ledge on the McKenzie Co. subcontract on Section 12A.

Group of Subcontractors Used Varied Methods and Equipment in Grading a Section West of Bedford

(Photos on page 48)

✦ CONTRACT 43, Section 12A, on the Pennsylvania Turnpike just west of Bedford, Pa., is an excellent example of how single contracts have been divided up into short sections so as to speed the work on the Turnpike to meet the deadline for completion, as well as showing the different methods of attack on a grading problem by different contractors. The 14,520-foot grading contract was awarded to Herman Holmes of Crystal Falls, Mich., on his low bid of $1,513,504.98 for completion within 150 calendar days from July 20, 1939, so as to permit paving in time to open the Turnpike in the summer of 1940. The work included 1,510,000 cubic yards of Class 1 excavation and borrow, and for structures 5,360 cubic yards of Class A concrete, 12,723 cubic yards of Class B concrete, 1,618,000 pounds of plain steel bars, and 1,989,000 pounds of fabricated structural steel. This article is confined to the grading by the various subcontractors and the general contractor, starting with work at the west end of the section and proceeding eastward.

From August 15 to November 1, Herman Holmes moved 550,000 cubic yards, Jacobson & McKinley Co. moved 320,000 yards and McKenzie Co. moved 205,000 yards, making a total yardage of 1,075,000.

Jacobson & McKinley Subcontract

This outfit started work at 4 a.m. on Monday morning and worked three 8-hour shifts a day through to 4 a.m. Saturday morning, thus giving each shift a

(Continued on page 20)

The Oil-Mat Roads Of Marshall County

Supervisor, in Interview, Tells of Construction and Maintenance Problems, Snow Removal and Finances

✦ IF the sand of the southwestern section of Marshall County, Indiana, and the heavy clay of the northeast corner and the gravel of the southeast portion could be brought together, a much larger mileage of improved roads could be in order. Since these various materials are scattered, the county relies on gravel for surfacing most of its 908.5 miles of roads, but has started an effective program of oil-mat construction which has already extended 72 miles. Only 16 miles of the entire system is still "just dirt road," a fact of which Andy Carothers, County Road Supervisor, is rightfully proud.

Oil-Mat Construction

During the past year about 60 miles of oil-mat work was completed of which 22 miles was new construction and the balance reworked. When a road is to have an oil-mat top, it is aimed to have about 800 cubic yards of loose gravel per mile of 18-foot road available for the work. The old gravel is scarified if it has packed so that it will consolidate with the new material. The added gravel is windrowed down the center of the road and then the entire yardage of gravel spread to a flat 12 feet wide.

This is shot with two applications of No. 6 road oil, which has about 40 per cent asphalt, ½ gallon per square yard

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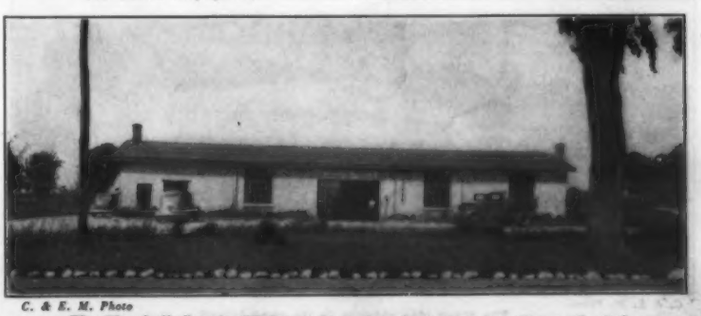


C. & E. M. Photo

The Marshall County Highway Department garage near Plymouth, Ind.

New Metropolitan Sewer

Sheeting, Mucking, Piles And Concreting Elliptical Section Sewer in Medford, Mass., by Edward M. Matz

(*Photos on page 48*)

✦ THE first section of the new North Metropolitan Trunk Sewer through Medford, Everett and Chelsea connecting with the East Boston, Mass., Pumping Station, was awarded to Edward M. Matz, Inc., early in October, 1938, and work started October 31, 1938. This first of the six sections consisted of 4,710 feet of open-cut trench for an 8-foot 6-inch x 8-foot 6-inch elliptical sewer including a 342-foot crossing of the Mystic River with three 54-inch-diameter cast-iron pipes.

Sheeting and Mucking

The work was chiefly through salt marsh land and in a sandy clay with a distinct hydrogen sulphide odor about the place. The entire work had to be well sheeted to support the sides of the trench. Tongue-and-groove wood sheeting 10 x 3 and in 22 to 26-foot lengths was driven with six Ingersoll-Rand sheeting hammers powered by I-R 220-foot portable compressors. As the sheeting was driven and the mucking proceeded, the accumulated water was removed with a 4-inch Homelite pump powered with a LeRoi engine. The sheeting was supported by a series of 10 x 10, 8 x 10, 8 x 8-inch wales on 5-foot centers vertically and braces spaced 10 feet apart, using 8 x 8 and 8 x 10 timbers.

The excavation was handled by a Koehring crane with a 45-foot boom and a ¾-yard Williams clamshell bucket. At the bottom of the trench 8 and 10-inch vitrified clay underdrains were laid beneath 8 inches of gravel, on top of which the 6-inch mat below the sewer invert was poured.

Pile Foundation

The unstable sandy clay would not support the heavy-section sewer so the plans called for a pile foundation with piles on 2-foot 6-inch centers. The section with pile foundation required approximately 1,000 piles in lengths from 35 to 53 feet and with 10-inch butts and 5 to 6-inch tips. They were driven by a driver mounted on a pair of greased poles to permit easy moving forward by means of a winch and side motion by a slight rolling of the poles. A 2,800-pound drop hammer handled by a Novo hoist drove the piles to the specified bearing.

As the butts of the piles extended through the 6-inch mat into the invert of the sewer for 2 inches it was necessary to do some hand mucking around the tops of the piles. This was done by two men hand-loading into a ½-yard cylindrical tip bucket swung by the second crane which had been used also for clamming out the top excavation. This machine was a Browning crawler crane

C. & E. M. Photo
Driving sheeting on Section 106A with I-R hammers while a 4-inch Homelite pump kept the trench dry.

with a 30-foot boom and a ¾-yard Williams clamshell for the major excavation. Water in the section of the trench being hand-mucked was kept down easily with a Gorman-Rupp 4-inch self-priming centrifugal pump.

Concreting

All concrete for the Matz sections was furnished by the Boston Sand & Gravel Co. and delivered to the job in 4-yard Jaeger truck mixers. The concrete for the mat was chuted into place, with one man on the chute and two men in the trench spreading. When the invert and barrel of the sewer were being placed a larger crew was used. For the barrel, Blaw-Knox steel forms were used as described in the companion section of this article on the Edward M. Matz Sections 106A and 104A.

(*Concluded on page 14*)

Contractor Completes Sewer In Everett, Mass., Quickly Following Delay by Spring Blizzard of March 13, 1939

✦ EDWARD M. MATZ, Inc., was awarded Section 104A of the North Metropolitan Trunk Sewer in Everett, Mass., as well as Section 106A described in the accompanying article. Section 104A runs for 600 feet beneath the boulevard strip as well as the south paved roadway of the Revere Beach Parkway which carries unusually heavy traffic during the summer to the popular North Shore resorts of Massachusetts. The high spot of this job was the speed with which the contractor handled the 600 feet of excavation in the parkway.

The total length of Section 104A was 2,137 feet and consisted of 11-foot 3-inch x 11-foot 3-inch elliptical-section monolithic sewer. The specifications set a limit of 100 days for the completion of the 600-foot section with a $100-a-day penalty for overtime. Work was started March 9, 1939, and was just getting under full steam when the March 13, 1939, blizzard came along and shut down work for ten days. The story in a nutshell is that Matz organized this work so well that the penalty section was accepted June 16, just five days ahead of the contract date.

The 600-Foot Section

Instead of using the conventional equipment of the eastern contractor, Matz elected to excavate with a 1½-yard Link-Belt machine rigged with a 50-foot boom for dragline operation. This

The Blaw-Knox steel forms and traveler for 11-foot 3-inch elliptical sewer on Section 104A of the Boston North Metropolitan Sewer.

same machine also worked with a 1-yard Williams clamshell. The dragline was used to excavate ahead of the sheeting to a depth of 15 to 18 feet and then the 20 to 22-foot 3 x 9 tongue-and-groove sheeting was driven. At the top rangers and braces were 8 x 8's, the latter spaced 10 feet on centers. The lower sets were all 10 x 10's, there being ten sets in all for the depth of the trench. A 1-yard Koehring crane with a 50-foot boom and a 1-yard Williams clamshell bucket was used for the excavation after the braces were placed for the sheeting. The work being in stiff blue clay, it was possible to handle the work as described as it stood with a vertical face for the 20-foot depth.

The excavated material was hauled out to handy dumps and the 600-foot section backfilled with gravel from the upper end of the job. The removal of the excavated material from the banks made possible deeper excavation without sheeting because it did not load the banks excessively. Five trucks were used with the dragline, handling about 600 yards a day of 11 hours, working two 5½-hour shifts.

Through a Dump and City Streets

Immediately following the parkway section the sewer went through a private right-of-way across a refuse dump. The material was piled considerably above normal ground level which would have made excavation excessive. The contractor overcame this by using an Allis-Chalmers L-O tractor with Baker bulldozer to move the top 5 feet of material back before starting excavation with the cranes and clamshells. As soon as the excavation in this section reached ground water, work was stopped temporarily and started at Station 0 where there was gravel and where it was possible to pump sufficiently in the coarse material to lower the ground water level 1 foot a day by pumping 24 hours a day and using a Complete 6-inch wellpoint pump without wellpoints and a 6-inch Carter Humdinger pump.

On the work described the contractor used a Universal truck crane for pulling all rangers and braces, keeping it busy by moving rapidly from one section to another.

On the trench work Matz used two

(*Concluded on page 19*)

Brazos River Bridge Near San Felipe, Tex.

A Novel Concreting Plant For Deep River and Bank Caissons for Bridge Piers Used by Brown & Root

✦ TO save a 111-mile haul of heavy equipment on a trailer back to Houston and out to Richmond and then north to Sealy, Texas, or loading on a flat car and hauling over the nearby railroad bridge, Brown & Root, Inc., of Houston, Texas, used a well-planned concreting set-up for the new highway bridge near San Felipe, Texas. The new bridge is a 920-foot structure with two 320-foot steel-truss river spans, one 60-foot approach span on the east end and one 60 and four 40-foot spans on the west end. The approaches are I-beam spans carried on piling bents.

The River Pier

The substructure of the main bridge consists of one river pier, and one bank pier at each end. The river pier is 19 x 48 feet 3 inches with a 9.5-foot radius nose on either end. It was sunk by the caisson method, using a sand island. An elliptical cofferdam 55 x 30 feet was driven with 40-foot Inland steel sheet piling having a 15-inch web, using a McKiernan-Terry 9B2 steam pile hammer. The piles were driven to a 15-foot penetration from a barge, using a Bucyrus-Erie steam crane for swinging the piles and furnishing the steam for driving.

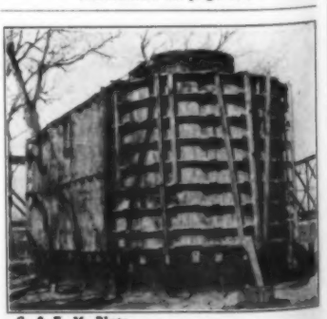
The cofferdam was filled by dredging from the river until the sand island was formed to a depth of 7 feet below the top of the coffer. Before the sand was placed, the cofferdam was excavated to explore for logs and boulders. The material in a shoal adjacent to the cofferdam was excellent for the fill. The cutting edge of the caisson was set on the sand fill resting on 6 x 8-inch timbers 4 feet long and a 20-foot lift of form built up, using 10-foot panels of 2 x 6-inch lumber with 2 x 6-inch studs and frame bolted together. The dredge wells were formed with 5-foot walls and remained uniform in area while the outside wall was stepped in as the height of the pier increased. The dredge wells were excavated with a Link-Belt crane having a 60-foot boom and a 1-yard Williams clamshell bucket on the same barge used by the steam crane for driving the cofferdam. Excavated material was cast downstream of the cofferdam.

The Bank Piers

The bank piers are similar in construction to the river pier but with walls 4½ feet thick and the two web walls are 3 feet thick and 12 feet apart. The overall length of the caissons for the bank piers was 18 x 47 feet 3 inches. The

(*Concluded on page 30*)

C. & E. M. Photo
The river pier caisson in its sand island.



C. & E. M. Photo
The west bank pier caisson cutting edge in place with forms ready for pouring.

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Road Repair—Operation—Betterment

Break Down Your Highway Maintenance Budget To Show Where the Money Goes

By G. H. DELANO, Engineer of Projects, Massachusetts Department of Public Works

For highway engineers to assume that those to whom they present their budgets are entirely familiar with all the phases of work involved in the maintenance and operation of highways frequently results in failure to obtain sufficient funds to provide adequately for complete maintenance, operation and betterment.

The work of highway maintenance departments has increasingly widened in amount and scope of activities, to meet the increasing use of highways and the mounting problems of their repair, improvement and the safe handling of traffic. Planning for this work has become proportionately complicated, if the sums set aside for the maintenance department are to be spread properly over the various activities now required.

Maintenance of highways has, of course, always been necessary and, before the advent of the automobile and of modern highway surfaces, consisted of the simple operations necessary to restore the ravages caused by the weather and the limited number of vehicles of the type using the highways at that time. With the increasing number of rubber-tired vehicles traveling at high speeds, different maintenance methods and materials were required. They were, however, still simple in character, consisting of the restoration or repair of the surfaces, guard rail structures and similar items. Traffic presented no particular problem, nor did the condition or appearance of the roadsides, and little work was done during the winter season.

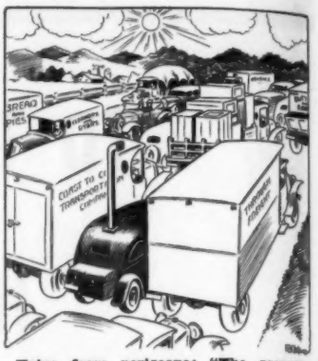
However, the continued increase in the number of vehicles, their weight, the speed at which they travel, and the concentration of these vehicles in areas contiguous to metropolitan districts have imposed upon maintenance departments the necessity for introducing new and additional methods, materials and equipment in keeping with the demands being placed upon the highways.

While this necessity has been recognized to some extent, it is probable that, for one reason or another, administrators, legislators and the public at large have not given due consideration to the growing importance of what *now* constitutes proper highway maintenance. Nor has the fact been recognized, or at least acknowledged, that the old concept of maintaining highways is no longer adequate.

Maintenance of highways today consists of far more than repairing damage caused by use. Without being fully recognized, even by some engineers, highway maintenance today includes the direction and control of the use of the highways; the conditioning of highways for all-year-round service by plowing and sanding; the provision of safe use of the highways by the installations of traffic lights, traffic striping, and similar traffic-control items; roadside maintenance, both for appearance and slope protection; and the many improvements which are designated as betterments.

Whenever the public is given a taste of that which is good, it demands more. Examples of good modern maintenance once observed cause the motoring public to expect that good maintenance will always be provided. This imposes upon the maintenance engineer more exacting and careful work. In addition, modern maintenance, covering many phases of work more carefully done, requires substantially larger sums than were provided for the simple maintenance work of the past. Inasmuch as these changes and additions have taken place

(*Continued on page* 33)



Voice from periscope: "The scenery along this road is wonderful, John!"

Keep Your Blasting Caps Out of Children's Hands

Each year there are numbers of children who are injured, and in some cases killed, from playing with blasting caps. Through education and cooperation, the number of accidents was slightly reduced in 1939. This number can be still further reduced in 1940 if all those using blasting caps see that they are not left around carelessly.

Small posters for display on bulletin boards and copies of a folder warning of the dangers of careless handling of blasting caps may be secured free by contractors and safety organizations direct from the Institute of Makers of Explosives, 103 Park Ave., New York City.

NORTH ATLANTIC SECTION AWARD WINNER AND PROJECT

The CONTRACTORS AND ENGINEERS MONTHLY 1939 Roadside Development Award for the North Atlantic Section was won by M. E. Hatch, Superintendent for Ralph Giovannucci on a 2.03-mile relocation project in Maine. 1. A scene on U. S. Route 201 before its relocation. 2. The same section of highway after relocation. Note the straightened road, better sight distance, and careful preservation of the existing vegetation. 3. Two of the features of this work were the care in preserving existing roadside growth, and the well-sodded slopes. 4. Placing slope checks during construction. Upper right, M. E. Hatch, indulging in his favorite "extra-curricula" activity of fox-hunting. See page 9.

Husky Hydraulic Hoists For Trucks and Trailers

Form 34 is the latest bulletin issued by Hercules Steel Products Co., Galion, Ohio, on its complete line of heavy duty hydraulic hoists and dump bodies for 2½ to 5-ton trucks, semi-trailers and third axle units. The features of the Hercules heavy duty center lift hoist are that since the lift is applied to the center of gravity of the body, it requires minimum lifting power, uses lower oil pressure and with double lifting arms prevents cramping of the load. The center lift eliminates strain on the hinge bowl as there is no pushing against the body hinges. Copies of Form 34 may be secured by our readers free on request to the manufacturer.

Union Metal Takes Over Steel Sheet Piling Firm

The Union Metal Mfg. Co., Canton, Ohio, has announced its absorption of the Corrugated Steel Sheet Piling Corp., formerly of Chicago. Alexander Mayer, former President of Corrugated, has joined the Union Metal organization as Manager of Sheet Piling Sales.

The manufacture of corrugated steel sheet piling, both standard and interlock types in 8, 10 and 12-gage steel, will be continued. It has been on the market for a number of years and has been used extensively in this country and in South America in the construction of sewers, cofferdams, bulkheads, bridges, dams, and similar projects.

The Union Metal Mfg. Co., manufacturer of steel street lighting standards for more than 35 years, also manufactures the tapered steel Monotube casing used for foundation piling and thus is well equipped to manufacture and market the new item of corrugated steel sheet piling.

Splicing Wire Rope

This is the title of an interesting 24-page handy-sized booklet recently issued by the Union Wire Rope Corp., 21st & Manchester Sts., Kansas City, Mo. The proper splicing of wire rope is extremely important to the safety and efficiency of any job, and this booklet contains clear and detailed instructions, illustrated by photographs and sketches, for making the various types of splices.

Copies of this booklet may be secured by interested contractors and engineers direct from the Union Wire Rope Corp. by mentioning this item.

A Snow King rotary plow working on a highway in Michigan.

Moving Deep Snow With a Rotary Plow

The outstanding feature of the Snow King rotary plow is that the V-point of the plow pierces the snow and feeds it back to the rotors which hurl it upward by centrifugal force, moving it clear away from the roadway. The deflecting chutes direct the discharge to either side of the road to take advantage of any wind. The distance the snow is thrown depends upon the rotor speed, which is determined by the power take-off from the D8 diesel tractor on which these plows are mounted.

There are two rotors, each having four blades, which turn at 340 rpm normally. Throw-out levers permit individual disengagement of the rotors and 2-way hydraulic controls permit holding or floating the plow between 24 inches above to 4 inches below the elevation of the tractor crawlers.

Complete information on the Snow King rotary plow with full specifications, both for the plow and for the tractor, will be found in Form 8-B1 which will be sent promptly on request by The Rotary Snow Plow Co., 1611 Central Ave., Minneapolis, Minn., to those mentioning this item.

Drill Steel Cutter And Shank Grinder

A new Size 500 drill-steel cutter and shank grinder, designed to handle solid or hollow steels up to and including 1¼-inch hexagonal, round or quarter-round, has recently been announced by the Ingersoll-Rand Co., 11 Broadway, New York City. It cuts the steel cleanly and squarely in only a few seconds without burning, a quick-acting self-locking vise holding the steel rigidly on both sides of the cut.

The unit can be changed readily from a cut-off machine into a shank grinder by removing the cut-off wheel and substituting a grinding wheel. As a grinder it can be used for squaring up striking faces of the shanks of drill steel, moil points, chisels and the striking end of rock-drill pistons. The machine is powered by an Ingersoll-Rand Multi-Vane air motor.

Asphalt Spray Bars With Clean Shut-Off

The Walker spray bar, which was first exhibited at the 1938 Road Show in Cleveland and then again this year in Chicago, has numerous features which are of interest to contractors in the bituminous field. The Model 99 Walker Bar has a positive shut-off which permits full circulation of the material from end to end and is designed for use on any asphalt distributor, new or old. The material is circulated through the bar on the way to the job, making it hot and ready for instant service on arrival.

A no-drip cut-off is secured by throwing a single lever and it is possible to drain the bar completely at night, regardless of the amount of material left in the tank. Another feature of this bar is that snap-on extensions in 1, 2 and 4-foot lengths can be added to the 8, 10 or 12-foot standard bars in foot increments up to 26-foot widths, merely by the use of a pair of pliers. Designed to be trouble-free, the Walker bar has only one moving part, the sliding plate with a cut-off ball valve at each nozzle which is set into the square section bar so that it is fully surrounded with hot circulating material.

When traveling to and from the job, a positive lock holds this bar in an upright position. Thus, the entire bar can be carried without removing the extensions and no tools are required to raise or lower the bar. Adjustible stops allow the Walker Bar to fit the crown of the roadway when applying bituminous material, supporting it firmly in the lowered position. The bar can be adjusted in height from the roadway and has a lateral swing of 2 feet to match joints and clear obstructions. Full details of the Walker bituminous spray bar may be secured from the Earl Walker Co., Sullivan, Ill., by mentioning this item.

Mixed-In-Place Paving in Florida

New Methods and Machines Used by Smith Engineering & Construction Co. on New State Route 39

+ A CONTRACT for mixed-in-place paving of the new state route No. 39, north of Ebro, Fla., was awarded last year to the Smith Engineering & Construction Co. of Pensacola, Fla. This contracting firm has been a pioneer in sand-bituminous road-mix construction and has worked closely with the Florida State Roads Department and the Mexican Petroleum Corp. in developing methods to improve the quality of mixed-in-place roads and, if possible, reduce their cost.

The new route is 20 feet wide, the combined sand and bituminous mix having a compacted depth of 7 inches when finished and rolled. Between 5 and 6 gallons of oil per square yard of finished road was applied, at the rate of one-third gallon per application.

Sequence of Operations

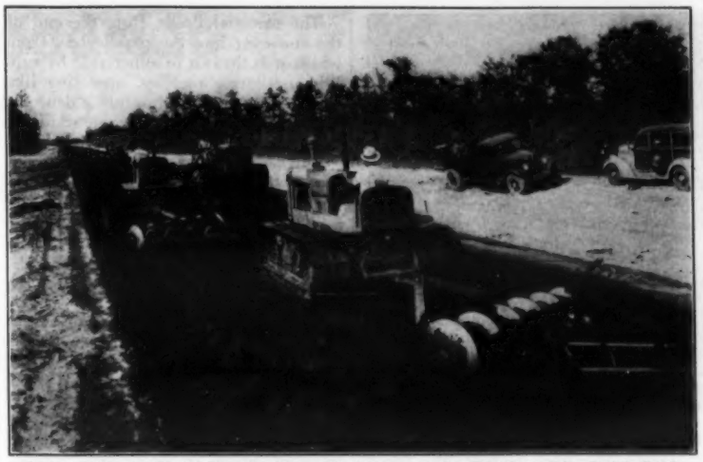
After preparing the grade, 3⅓ gallons of oil per square yard was applied in ten applications, using ⅓ gallon per application, and disking after each application with one of the four specially built 8-foot offset disk harrows, utilizing International Harvester 26-inch plow disks, which are used by the contractors for this type of work. These harrows were pulled by TD-40 diesel-powered tractors.

With the harrows and a special mixing machine the oil was distributed throughout the road material to produce a homogeneous mix. The mixing machine used is based on an Adams No. 61 maintainer, with special features developed by Smith Engineering & Construction Co. to meet the requirements of this type of paving. One of its features is that it leaves no windrow but instead the material is spread out over the roadway.

Then with a blade grader the material was pulled from the edges toward the center, using the mixing machine and harrows at the same time, and two more applications of oil made. Mixing was then continued until a thorough blend of the oil and sand was obtained. The road was then shaped with blade graders, an Adams 12-foot rubber-tired grader pulled by a TD-40 and a 12-foot grader equipped with wide-face wheels pulled by a T-40 gasoline tractor. A special short blade behind the T-40 TracTracTor was used to shape the edges. The road was then rolled at least twice with a 5-ton Buffalo-Springfield roller.

One of the new pieces of equipment on this job was the TD-18 TracTracTor, the first of that model delivered to Florida, which was used to pull the special mixing machine. Despite the heavy load, this TD-18 pulled the machine in second gear, at the rate of 175 feet a minute or 2 miles an hour.

In addition to the equipment mentioned above, this contractor owns eight International trucks and a heavy-duty International-Harvester brush breaker plow, as well as eleven TracTracTors.



Three of the six TD-40 TracTracTors and the new model TD-18 used by Smith Engineering & Construction Co. on a mixed-in-place road job on State Route 39 in Florida.

Personnel

Smith Engineering & Construction Co., contractor for this project, has been in business since 1930. It has built mixed-in-place pavements in Florida and Mississippi and completed numerous grading, surface-treatment and retread contracts in North Carolina, Georgia and Alabama.

The officers of the company are C. W. Smith, President; Shelby Smith, Jr., Vice President; and W. R. Wilson, Secretary and Treasurer. M. F. Gonzales was Superintendent on this project for paving State Route No. 39.

E. D. Herrick Heads Linn

The election of E. D. Herrick as President has been announced by Linn Mfg. Corp., Morris, N.Y., manufacturer of Linn tractors. Mr. Herrick has had wide experience in the automotive industry for the past 20 years as Chief Engineer, Asst. General Manager and President of Lycoming Mfg. Co., Williamsport, Pa.

The new Heil 8-yard Motorscoop with a 70-hp motor is capable of dumping and spreading a full load in 6 seconds.

Self-Propelled Scoops That Move Dirt Fast

With the aid of a pusher tractor, the new Heil Motorscoop picks up a full 8-yard load of pay dirt in less time than is required to load a dump truck of equal capacity, according to the manufacturer. Then under its own power it can be driven to the fill at hauling speeds up to twenty miles per hour if the roadway permits. This new self-powered earth-moving scoop combines the well-known Heil Dig-N-Carry scoop with an LI Case engine. The unit runs on rubber-tired wheels and is equipped with eight speed transmissions, giving a travel range from 1.9 mph to 20 mph.

Approximately 70 per cent of the weight of the loaded Motorscoop is carried by the rear drive wheels, assuring maximum traction. Operating tests have shown that this unit will run successfully on side slopes up to 33 per cent because of its low center of gravity. Since it has an overall width of only 8 feet and is mounted on pneumatic-tired wheels, the Motorscoop can be operated over the public highways where some other types of scoops are not permitted.

Detailed specifications of the Dig-N-Carry Motorscoop may be secured from The Heil Co., Milwaukee, Wis., by asking for a copy of Bulletin RM-450 and mentioning this item.

A Paddle Spreader Aids Ice Control

A paddle-type spreader, which approximates the spreading of hand-thrown material over an icy surface, but more evenly, has been developed in the Model Y-286 motor-driven spreader of Good Roads Machinery Corp., Kennett Square, Penna. This spreader is operated entirely by an independent power unit controlled by the truck driver. The speed of the power unit controls the speed of the screw conveyor beneath the truck body, which is a 6-cubic yard bin, and also the speed of the paddle-type spreading device which receives the material from the conveyor.

The material drops from the end of the conveyor into the paddle box from which it is thrown to either side by rapidly oscillating paddles, operating like a pendulum. Adjustable deflector plates accurately regulate the width of the spread.

Further details of this effective spreader may be secured direct from the manufacturer by mentioning this item.

Take Your Crusher Right Onto the Job

There are three models of the Eagle traveling stone crusher, each made in two or more sizes. These jaw crushers are mounted on a tractor chassis, making the unit readily portable by its own power, and the tractor engine drives the crusher. It is particularly serviceable mounted either on pneumatic tires or steel wheels as a solution to road building and maintenance work. In many localities rock and stone can be removed from land and placed along the roadside and then can be crushed and distributed, thus benefitting the property from which the material is derived as well as the property owner by assuring him better roads.

The Model F has a 9 x 16 crusher with a capacity of 4 to 20 tons per hour and is adjustable for crushing ½ to 3-inch material. Model S, built in three sizes, has an 88-inch wheelbase with front wheels that will turn 180 degrees. The feed opening is only 33½ inches from the ground. Model T, made in three sizes, is a trailer unit operated by a power take-off from the tractor which hauls it.

There is also a still heavier unit, Model E, which is self-powered and driven by a 35-hp motor. The Eagle truck-type crusher, mounted on a heavy duty chassis, is a 9 x 16 unit driven by a power take-off from the truck motor.

Complete information on any of these Eagle traveling stone crushers may be secured from Eagle Crusher Co., Inc., Galion, Ohio, by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Road and Roadside Made Complete Unit

North Atlantic Section Award Winner Made Contribution to Result by Unusual Care in Handling Roadside Items

(*Photos on page 4*)

✦ IN nominating M. E. Hatch of Jefferson, Maine, Construction Superintendent for Ralph Giovannucci, for one of the 1939 CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards, the Maine State Highway Commission engineers gave much credit for the creation of an exceptionally well-finished scenic highway which blends completely and naturally into the surrounding countryside to the ready cooperation and efforts of Mr. Hatch. For his efficient salvaging of top soil, his care in protecting existing trees and roadside vegetation, his methods of sodding, his cooperation with the state highway engineers, and the general excellence of his work, Mr. Hatch was given the North Atlantic Section Award in the 1939 Roadside Development Awards made to highway contractors or their superintendents by CONTRACTORS AND ENGINEERS MONTHLY.

The Project

This project was a relocation of 2.03 miles of U. S. Route 201, the Arnold Trail, located in the town of Vassalboro, Maine. This new highway, 82 per cent of which passes through fields and pasture land, is located on a hillside sloping downward to the Kennebec River and overlooks long vistas of river and surrounding countryside, making it one of the outstanding scenic roads completed in Maine in recent years.

Throughout construction every attempt was made to combine cut and fill slopes, drainage ditches, roadway and old ground with one another in such a way that no rough edges were left, so that the completed highway would be streamlined naturally into the surrounding topography.

A number of landscape and erosion-control items were a part of the contract which was awarded to Ralph Giovannucci of Pittsfield, Maine. These items included loaming, sodding, scarifying and removing old pavements, plank curb, plank sluices, and slope checks. In addition, the design called for slopes of 1 on 2, with the cut slopes rounded. Parking areas were provided.

Hatch's Contributions

M. E. Hatch, Superintendent for the contractor, recognizing the value of the top soil lying within excavation areas, stripped and stockpiled large quantities which he later used for loaming slopes in preparation for seeding by state forces. The balance of the loam required was obtained from a field along the highway. After the loam had been obtained, the pit was carefully smoothed over, although this work was not required under the terms of the contract.

A Maine highway on new location, showing, on the right, slopes loamed in preparation for autumn seeding by state forces.

At one point along the new highway, there was a large grove of white pines and incidental undergrowth. Great care was taken to preserve as much as possible of this grove.

In excavating berm ditches and slope drains, and in sodding the latter, especial care was exercised and excellent results obtained by so shaping them that they blend smoothly into the cut slopes and existing ground.

Areas of exposed ledge cut which presented a rough and jagged appearance were backfilled with borrow and graded to form a uniform slope, although this work was not required under the contract.

Sodding an Important Item

The subsoil on the project is silty clay. Therefore, in order to prevent the sod from sliding before it had become established, slope checks were installed 10 feet apart on the slopes, parallel to the ditch lines. These checks consisted

(*Concluded on page 17*)

Activity on the first paving contract awarded on the Pennsylvania Turnpike. Walker Bros. of Chambersburg, Penna., contractor for this $886,027.28 section, used a 7-ton Huber motor roller on the subgrade.

Increase in Diesels Seen at Road Show

The advance made by General Motors 2-cycle diesel engines in the earth-moving, road-building and general construction field since the introduction of the small or 71 series of engines less than two years ago was revealed by a survey of the equipment on display at the A.R.B.A. Road Show in the International Amphitheater in Chicago. None of the twenty-three power plants at the Show was available even for display purposes at last year's Show.

Fifteen of the General Motors diesels at the Show powered equipment of recognized manufacturers in the field. Of the remainder, two were in General Motors trucks and the rest in the exhibit of the Diesel Engine Division of General Motors Sales Corp., Cleveland, Ohio.

At the Allis-Chalmers display there were seven of the new large Model HD-14 tractors, powered by 6-cylinder General Motors diesels, and models of smaller units to be equipped with 3 and 4-cylinder GM diesels were exhibited for the first time. Other A-C HD-14's were found at the exhibit of Gar Wood Industries, Inc., of Detroit, and the Baker Mfg. Co., Springfield, Ill., where they were used to display the tractor equipment made by those companies.

The Koehring Co. exhibited its Dumptor and Wheeler, both of which are powered by 4-cylinder 71 series General Motors diesels, while a 3-cylinder unit of the 71 series provides the power for the operation of the upper deck machinery of a Model 200 A excavator displayed by the Harnischfeger Corp. A similar power plant is used in the heavy-duty ¾-yard dragline shown by Bay City Shovels, Inc., of Bay City, Mich.

The new Moto-Crane, recently announced by the Universal Crane Division of the Thew Shovel Co., is powered by a 3-71 engine and is mounted on an especially designed crane carrier capable of speeds up to 31 mph.

At the booth of the Diesel Engine Division were the packaged power units. Two of these are 6-cylinder units, one equipped with a torque converter or hydraulic clutch for belt drive; the other a 90-kw generator set with the engine, generator and control cabinet fully enclosed, protected from the weather. Rated at 90 hp for continuous service, the engine powering each of these units is mounted on a structural steel base that holds the radiator, starting batteries and fuel tank. A small size of a single-cylinder 10-kw generator set was also on display.

Truck Shovel Has Four-Wheel Drive

A feature of the new truck shovels of ⅜ and ½-yard capacities recently announced by the Michigan Power Shovel Co., Benton Harbor, Mich., is their four-wheel drive for added traction on rough ground. Mounted on a special Michigan chassis, these Models TF6 and TF8 are quickly converted from shovel to crane, dragline, clamshell or trench hoe. The addition of the front-wheel-drive axle adds to the maneuverability of these machines without decreasing mobility on the highway, and the modern constant-velocity joint on the front axle increases the ease of steering, according to the manufacturer.

To permit a high production rate, the operator's controls are conveniently arranged and the design permits full-circle swing of the boom. Air clutches handle the shovel and boom mechanism. The truck chassis, which is specially designed by the manufacturer, permits an unusually low center of gravity to add to the stability of the machine. Gasoline or diesel power is available, and all drum shafts and turntable rollers turn on ball bearings. All wheels are equipped with Lockheed hydraulic brakes and 10.50 x 20 tires.

The new Michigan four-wheel-drive truck shovel.

Fast Batching Units For Concrete Paving

J. R. Griffith Completed 7.63 Miles of 20-Foot Slab With Well-Balanced Crew At Edgerton, Wis.

(*Photos on page 48*)

IT takes a keen sense of proportion to balance a paving organization for a dual drum paver so that there will not be a paucity of batch trucks, or so that the paver will not be running up the back of the form setters, or run away from the finishers. J. R. Griffith, with a long background of 27-E paver experience, has stepped up his organization uniformly throughout to maintain close to 200 feet an hour with his 34-E Koehring paver.

Early in September, 1939, Griffith completed pouring 7.63 miles of 20-foot concrete slab between Janesville and Edgerton, Wisconsin, on a new location of U.S. 51. The slab section was 9-6½-9 inches with a 1⅜-inch parabolic crown on the subgrade and the slab, and with the thickened edge extending in 24 inches from each side. This section required 0.4167 cubic yards of concrete per linear foot of pavement. The daily runs were from 188 to 200 feet per hour with the best week 8,072 feet in 42 hours. The maximum week allowed was 44 hours.

In Edgerton the pavement was widened to 30 feet for 1,000 feet, and required the resetting of all catch basins and manholes. As this highway is the only outlet to the south it was necessary to pour all intersections one half at a time, using high-early-strength cement.

Preparation of Base

An insulation layer ±4 inches thick at the center was spread the entire length of the job, using a mixture of top soil and sand. This was spread the full 40 feet of the grade, including the 20-foot pavement and the two 10-foot shoulders. There were two pits at the south end of the job and a larger pit at the north end. This large pit was unusual inasmuch as it was heavily eroded and at some time in the past this had been checked by careful work as the pit was heavily overgrown with low shrubs and weeds. A Koehring 503 shovel of 1½-yard capacity loaded the material into the contractor's own trucks, a fleet of Internationals, for delivery to the road. As a Caterpillar D7 and a 9-yard Carryall were on the job for some other work and Griffith's blade was busy elsewhere he used the tractor and scraper for blading the insulation material on the grade. The heavy tires of the Carryall so well compacted the top soil and sand that the batch trucks used this section as soon as the scraper left it.

Fine Grade and Forms

With a crew of six men clearing the form trench after it was cut by a Ted Carr Formgrader and six men with the foreman setting the 9-inch Metaforms, they kept a good distance ahead of the paver at all times. Two men were busy cleaning the forms of all concrete before they were reused and, after setting, one man went down the line driving the pins and setting them, with two men hand-tamping the bases for a firm foundation. All form joints were straight-edged before final lining up to be sure of the grade for the finishing machines.

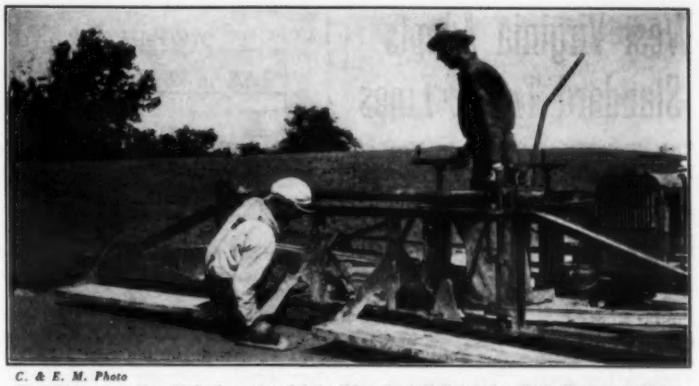
An R-B subgrader with a ramp for the batch trucks cut the slightly high base to true shape for the Austin Pup 5-ton roller to compact ahead of the paver. All of the batch trucks turned through a space in the forms and backed to the paver. Between the subgrader and the paver the forms were oiled by a man with a hand brush. Two pairs of the grade men went back in the early morning and stripped the forms, loading them on one truck at each side and spotting them forward for the setters.

Batching Aggregate and Cement

All of the gravel and sand was batched at the local plant of the Edgerton Sand & Gravel Co. from stockpiles maintained by the producer. A Northwest crane with a 50-foot boom and a Kiesler 1½-yard clamshell bucket was kept really busy supplying the two Butler weighing batching plants, one for the ¼ to ¾-inch and ¾ to 1½-inch stone and the other for the sand. The batch trucks backed under the two bins and then went forward about 500 feet to the bulk cement dock. The batching was subbed to one man who hired a fleet of trucks from local owners and included several of Griffith's trucks to set the pace. There was a maximum of 29 trucks for the long haul, each carrying two batches on dual pneumatic tires.

The cement dock was built alongside the railroad siding in Edgerton and cement was moved from two cars at a time, using a dock only slightly longer

(*Continued on page 38*)



C. & E. M. Photo

Finishing over the 2¼-inch center-joint ribbon installed by the Cleft-Plane machine.

West Virginia Adopts Standard Traffic Lines

This State Joins Others in Use of Double Solid Line at Hazardous Points to Indicate "No Passing"

By E. L. WORTHINGTON,
State Maintenance Engineer, State Road Commission of West Virginia

✦ A NEW traffic-line marking system, similar to the system being made standard by a number of other states, was adopted and put into practice in West Virginia last spring. The reaction of the public to this new system, which includes the marking of no-passing zones by a double solid line, has been most favorable and state highway engineers believe that a material reduction in the number of accidents will result, due to the fact that such a large number of highway accidents can be traced directly to attempting to pass at the wrong places.

The Single Broken Line

This line consists of alternate 50-foot lengths of 4-inch wide solid single line and blank spaces and is used to mark all tangents more than 150 feet in length, except those places on tangents where a double solid line is used to designate no-passing zones. The purpose of this single line is to divide the traffic lanes to promote safer driving. This line may be crossed in passing the car ahead but should not be crossed unless it is necessary to do so.

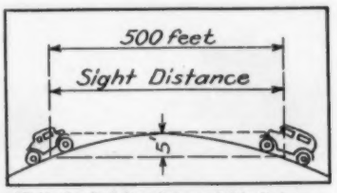
The Single Solid Line

This line is painted 4 inches wide in a continuous stripe and is used to mark all vertical and horizontal curves, except the curves or parts of curves where a double solid line is used to indicate no passing. The curves on which these single solid lines are used are the lighter curves on which it is possible to pass the car ahead cautiously, providing the way around is clear. The purpose of the solid line is to divide traffic lanes for safer driving and the line must not be crossed, except for passing the car ahead.

The Double Solid Line

This line consists of two continuous 4-inch stripes with a 4-inch space between them and is used to designate no-passing zones at locations where it is dangerous to pass the vehicle ahead. The most common application of this double line is on horizontal curves which have limited sight distances and all vertical curves having a sight distance of less than 500 feet, determined as shown in the sketch. On widened sections, such as curves, the traffic line is placed in the lateral center of the pavement.

Where a side or cross-road approach joins the highway in a no-passing zone, the double line is omitted at the proper place and for a distance of approximately 40 feet to permit the lawful turning in or out of the highway to or from such an approach. There is no indication, however, of any protection to vehicles making such turns, as the protection offered by the double line is for the main highway only and such turnouts should be made only when safe opportunity is afforded.



Method of determining sight distance on vertical curves.

In addition to this double solid line painted on the center line of the pavement, signs with the message "Do Not Cross Double Line" are erected at strategic points along the highways to inform the traveling public that these double lines are not to be crossed. These signs are placed about every 3 miles and are erected near the beginning of a section of double line so that a motorist reading the sign will immediately see the double line and thus be more likely to understand the message.

The locations which have been established as no-passing zones are those places at which it is unsafe, and unlawful, to pass the vehicle ahead, and are marked in order to make them more conspicuous and at the same time furnish law-enforcing officers with definite limits for such danger zones.

These definite no-passing zones are designated only where absolutely necessary and their length has been kept to a minimum. Each danger spot is carefully studied by competent highway engineers before being selected for the double line. Therefore motorists in West Virginia know that when they encounter a double line no attempt should be made to cross as danger lurks on the other side.

Color of Paint

White paint only is used for all traffic lines, because the white color is considered the most effective under all conditions. West Virginia prefers the single color rather than the two-color combination (white and yellow) because it is difficult to differentiate between white and yellow at night, in fog, during rainy weather, and also when the lines begin to wear out.

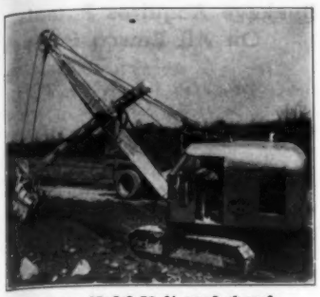
Standardization Needed

There is great need for standardization of traffic lines and markings and it is to be hoped that all the forty-eight states will soon work out and adopt a nation-wide method of giving the traveling public this much-needed service.

E. D. Emerson Appointed Roebling Gen. Sales Mgr.

Edward D. Emerson, District Sales Manager with Babcock & Wilcox Tube Co., New York City, since 1937, has been appointed General Manager of Sales for John A. Roebling's Sons Co., Trenton, N. J.

Mr. Emerson is a mechanical engineering graduate from Harvard University, 1923. Previous to his association with Babcock & Wilcox, he was sales engineer with Jones & Laughlin Steel Corp.



The new Model 83 ¾-yard shovel.

Streamlined Shovel Displayed by Byers

The feature of the exhibit of the Byers Machine Co., Ravenna, Ohio, at the A.R.B.A. Road Show in Chicago was its new ¾-yard streamlined gas or diesel-powered shovel, equipped with either chain or cable crowd.

The main frames and shovel booms on this 1940 Model 83 are of oxygraph-torch-cut die-formed and electrically welded rolled-steel plates of thicknesses up to 2½ inches. Ball and roller bearings carry all major shafts and friction disc clutches. Drive is from the 72-hp 6-cylinder motor through a silent chain, enclosed and running in oil. Features of construction include the two-speed crawler, electric starter and mechanical dipper trip which are standard equipment. Other features include the self-cleaning treads, 72-hp motor, positive independent low-speed crowd with high-speed retract on the shovel, 170-fpm hoist line speed and ability to hoist and swing while traveling or steering.

New specially-prepared literature on this Model 83 and the other current Byers machines may be secured by interested contractors and engineers direct from the manufacturer by mentioning this item.

Stop Frozen Water Ballast In Weighted Tractor Tires

It is common practice to add extra weight to the driving wheels of tractors equipped with pneumatic tires to increase the drawbar pull. The use of water ballast instead of metal weight is less expensive, reduces the bounce and improves the riding qualities, prevents slipping when turning corners by lowering the center of gravity, keeps the tires rounded out in better shape, slows up air diffusion in the tires, reduces tire wear and tear and increases the life of the tractor.

Since water ballast is likely to freeze in cold weather anti-freeze solution should be used. Dowflake, produced by The Dow Chemical Co., Midland, Mich., when placed in solution costs less than any other anti-freeze material. It gives a solution heavier than an equal volume of plain water and does not deteriorate and can be used over and over again in any number of tires.

Dow Chemical Co. will be pleased to send to users of pneumatic-tired tractors a folder telling exactly how to make the Dowflake solution, the fittings necessary to inject the solution into the tire tubes and a table showing the proper solutions to use for various low temperatures.

A Low-Alloy Steel That Resists Rust

A modern low-alloy, high-strength steel that fills the gap between low cost structural steel and the high priced alloys in the stainless classification, and which is particularly adaptable to bridge construction has been developed by Bethlehem Steel Co., Bethlehem, Penna., in its Mayari R steel. This steel has working and welding qualities similar to structural steel and requires no heat treatment after forming, except in the case of the usual mill annealing of light-gage material such as sheets, being useful in the "as-rolled" condition.

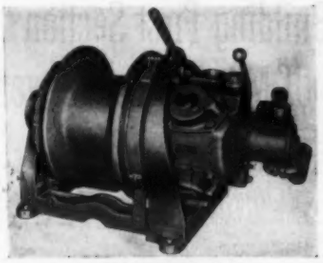
Notable corrosion tests of this steel have been made in industrial atmospheres such as Pittsburgh, in sea water at Boston and in tap water for two years at 40 degrees centigrade. Complete information on this valuable steel will be found in Folder 422.

When structures are lightened because a higher strength steel is used corrosion resistance becomes of extreme importance. The corrosion tests referred to showed that Mayari R has a decided superiority to mild carbon steel, copper bearing steel and wrought iron, particularly in resistance to atmospheric corrosion. The ratio of corrosion resistance shows that this low-alloy steel has a resistance five to six times that of mild carbon steel, and two to four times that of copper bearing steel, with a similar superiority over wrought iron.

Folder 422 and Catalog 152, which may be secured direct from Bethlehem Steel Co., Bethlehem, Penna., by those mentioning this item, give many additional facts regarding the uses of Mayari R, its chemical composition and its physical properties.

Reversible Hoists

The Sullivan Class L-111 single-drum reversible Pistonair hoist, made by the Sullivan Machinery Co., Michigan City, Ind., is a light compact unit, equipped with large diameter drums for long rope wear, heavy-duty Lubriseal ball bearings and a four-cylinder reciprocating air motor. It is fully enclosed and can be furnished with either positive or friction type clutch. It is designed for convenient and economical service in both surface and underground applications.



The Sullivan Pistonair hoist.

A new bulletin 75-R, describing and illustrating this Pistonair hoist, was recently issued by the manufacturer who will be glad to send copies on request to interested contractors and engineers who mention this item.

Building First Section Of Metropolitan Sewer

(*Continued from page 2*)

Crossing the Mystic River

The river crossing was handled with a cofferdam of steel sheet piling in two sections. To facilitate the work the contractor built a heavily decked wooden construction trestle alongside the site of the cofferdam on which he worked his crane for driving the sheet piling, excavation and concrete trucks. This was built in easily handled sections for one half the width of the stream or the length of the first cofferdam section. Then when the work on that section was complete the trestle was removed in sections and set up again on the other side of the river for the second section of the cofferdam.

The first cofferdam was on the east side of the river and measured 187 x 20 feet. It consisted of 19-inch Lackawanna steel sheet piling in the specified 40-foot lengths driven by subcontract. The piles were driven 6 feet below the grade of the sewer. The borings taken at the two banks of the stream failed to show the true character of the material in the stream bed so there was some excess leakage into the east cofferdam, necessitating the placing of a temporary bulkhead 50 feet from the outer end of the coffer. This was made with two lines of 3 x 9 sheeting 6½ feet apart and puddled with clay. The outer and inner sections were kept unwatered for the duration of the work with a 6-inch Rex Speed Prime pump in each section. For unwatering the sewer section that had been completed before the winter and had filled by end leakage, a pair of Gorman-Rupp 4-inch centrifugals was used.

The excavation within the cofferdam was carried to 29 feet below high water so that careful bracing of the cofferdam was necessary. The contractor used one set of wales at high tide elevation, one set at low tide and two lines of 12 x 12-inch wales at the top and 12 x 16's at the bottom. The wales were 3, 5 and 9 feet apart and the 12 x 12 braces spaced 8 feet on centers.

Personnel

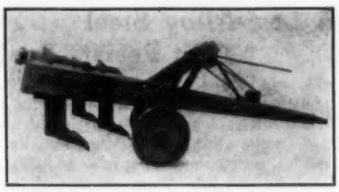
The contract for Section 106A of the North Metropolitan Trunk Sewer, PWA Mass. Docket 1419F, was awarded to Edward M. Matz, Inc., of Jamaica Plain, Mass., on the low bid of $318,157. Alexander "Sandy" Martinello was Superintendent with James M. McDonnell as General Foreman, and Edward M. Matz in immediate charge of all operations. James Austin O'Rourke was Resident Engineer for the Sewerage Division, Metropolitan District Commission, of which Joseph P. Dever is Chief Engineer, and Joseph N. Fish was Resident Engineer Inspector.

Heavy-Duty Rooter For Shale and Hardpan

To speed scraper production and extend its efficiency into rock, shale and hardpan, R. G. LeTourneau, Inc., Peoria, Ill., has developed the 9,150-pound extra-heavy-duty K3 Rooter. Claimed to be the largest and heaviest Rooter ever built, this new unit is equipped with three teeth having a maximum depth of 28 inches. Each is removable to meet job conditions and secure the desired fragmentation. The center tooth is set ahead of the others to gain quicker penetration into hard material.

In order to provide easier penetration and keep the teeth feeding into the material, the ends of the rooter shanks are built at a steeper angle than formerly used on rippers. Hard-faced self-sharpening teeth shaped for natural digging suction fit like caps on the end of the shanks. A bumper frame, mounted on the rear, is arranged for the use of a pusher tractor in the toughest material and increases the weight of the Rooter for effective digging. For greater strength, the Rooter is built in a simple T construction and like all LeTourneau equipment is arc welded.

Complete information on the K3 Rooter may be secured direct from the manufacturer.

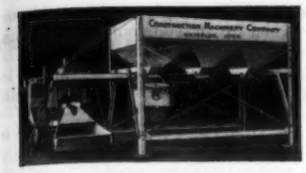


The extra heavy-duty K3 rooter.

Buckeye Acquires Patents On All Emsco Products

Through a recent transaction The Buckeye Traction Ditcher Co., Findlay, Ohio, now owns all Emsco tractor equipment patents as well as those patents under which Emsco was licensed or had working agreements, and all Emsco applications for patents. The features of construction and these patents covering tractor equipment which consists of trailbuilders, bulldozers, rippers and tractor power control units place Buckeye in the position to serve the industry with the newest engineering developments. The large plant, excellent manufacturing facilities and central location are especially advantageous in the construction equipment industry.

This tractor equipment is being manufactured at Findlay, Ohio, exclusively, and sales are handled also from the Buckeye general office in Findlay. An export office is maintained at 80 Broad Street, New York City.



The new CMC portable bin and batching plant.

Novel Bin-Batcher Serves Many Jobs

Bridge builders, concrete products men and many other contractors showed particular interest in the CMC bin-batcher exhibited for the first time by the Construction Machinery Co., of Waterloo, Iowa, at the 1940 Chicago Road Show. It consists of a 3-compartment steel bin with a total capacity of 21 tons so built that space can be provided between the sand bin and the other two when required. Mounted on a substantial steel frame with a monorail beneath, the weighing batcher runs under each bin for its load and then at the extended end can deliver to a 10S or 14S mixer, truck mixer or batch truck. Two men can charge and operate a mixer and then when it comes time to move the bin-batcher, it can be mounted on its own wheels and trailed or easily carried on a truck when partly dismantled. The bins can be loaded by a crane or conveyor or, where topography is satisfactory, truck deliveries can be made from a ramp or side hill. The complete plant is offered; or the weigh batcher in three sizes, trolley and gates can be furnished to those who want to build their own bins.

The new CMC bin-batcher is described and illustrated on pages 43 and 44 of the new CMC Construction Equipment 48-page illustrated catalog which also covers many other interesting items, including mixers, wellpoint pumps, saw rigs, etc. Write to Construction Machinery Co., Waterloo, Iowa, for complete information, mentioning this item.

Hard-Surfacing Tips

A new set of Rego multiple tips for hard-surfacing, designated as the Rego GXH series, is now available in four different sizes, GXH 72, 68, 60 and 56. According to the manufacturer, the Bastian-Blessing Co., 242 E. Ontario St., Chicago, Ill., these tips make it possible for any experienced welder to produce hard-surfacing jobs absolutely free of soft spots and pin holes.

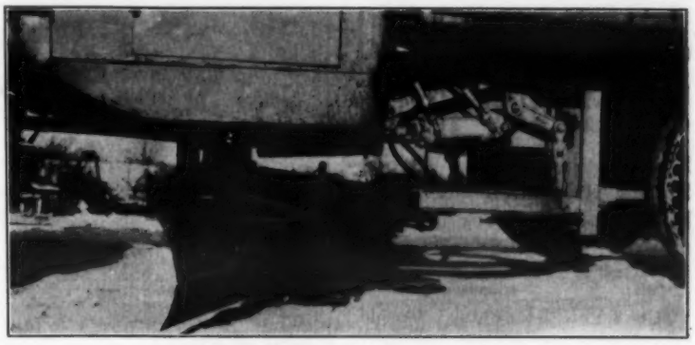
The multiple-hole tip construction permits high heat output yet produces a soft brush-like flame that is claimed to eliminate turbulence in the weld puddle, thereby preventing detrimental pin holes in the applied hard-surfacing material after it has cooled. The wide flame is designed to make it easier for the operator to keep the weld zone and the rod in a protective carbonizing flame envelope, eliminating harmful oxidation. The individual mixer in each tip is designed to provide correct gas mixing and economical operation.

New Truck Grader

One of the new pieces of equipment displayed at the A.R.B.A. Road Show in Chicago was the new Willett underbody truck grader just announced by the Willett Mfg. Co., Grand Rapids, Mich. This new 1940 model truck grader is powered hydraulically by a continuous running oil pump operated by a power take-off on the truck transmission, with the controls mounted in the truck cab, convenient to the driver's hand.

In addition to maintaining the level surfaces of dirt and gravel roads, the unit is designed for the maintenance of slanting shoulders, for use as a grader in shaping the crown of secondary roads, and for cleaning hard packed snow and ice off pavements and road shoulders. With the blade set at a vertical angle, it will handle light snow up to several inches in depth.

The curved moldboard and blade can be used in either a rigid or flexible manner merely by opening or closing a cut-off valve on the Willett cushion device which cushions the contact of the blade with the road surface. All adjustments both of the machine and the slope and angle of the blade are hydraulically controlled from the driver's seat in the truck cab, and the moldboard or blade can be used in any slope from the complete vertical to the horizontal, as may be required by working conditions. Another feature is a mechanical locking device which automatically locks the machine in any cutting position. Lengths of 10, 12 and 14 feet are available. The unit has high road clearance under the lifted blade when it is not in use, thus making it possible to convert any highway truck into a grader when desired.



The new Willett underbody truck grader.

Literature describing the 1940 Willett underbody truck grader may be secured by interested state and county highway engineers and contractors direct from the manufacturer.

Jules Verne—1940 Sees Future Roads

Norman Bel Geddes Visions Future Highways and Cars Built for Greater Safety At Higher Speeds

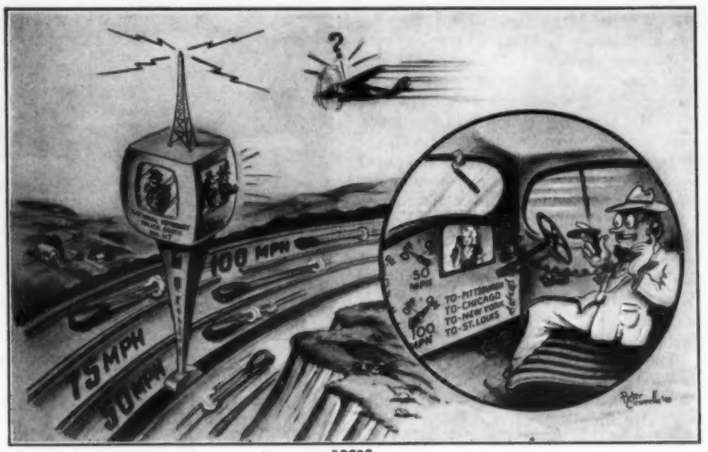
(*Photos on page 48*)

✦ JULES VERNE, 1828-1905, foretold our submarines and airships, making his readers gape with wonder. The Jules Verne of today has told his story in two mediums not available to the earlier prophet—a gigantic diorama and the radio.

Norman Bel Geddes envisaged highways of tomorrow in the gigantic Futurama which featured the General Motors Exhibit at the New York World's Fair of 1939 and will attract another 4,700,000 visitors this coming season. In October, 1939, speaking at the New York Herald Tribune Forum and to a great radio audience, Geddes voiced his belief in safer highways for greater speeds twenty years from now. He stated in part: "Highways should be designed not on the basis of present day requirements, but on the probable requirements of twenty or thirty years hence. A road that has to be replaced in ten years is costing twice as much as one that lasts twenty years.

"On our express motorway we would not only separate traffic moving in opposite directions, but each lane of traffic going in the same direction would be segregated. Traffic would move in lanes at automatically controlled speeds; no faster, no slower. The slow driver is as serious a menace as the too fast driver. Should you want to go faster, you pass through a transition lane to a faster lane. On this motorway you will be as safe at a 100 miles an hour as you will be at 50, and you will be safe at the 50-mile speed. You can enter the motorway, pass from one speed lane to a lane of greater or lesser speed without fear of collision. Side swiping is prevented. It is impossible to cut in and out. There are soft shoulders but you cannot get your car off the road on to them. This may be accomplished by either a special curving curb that deflects the car wheels back on the road or more probably by electric-magnetic control in the center of each lane, which would keep the car on its course more accurately than an airplane is kept on its course by a radio beam, or a ship by a compass.

"It is a misconception to think of speed as a danger factor. In spite of the command to go slow, 90 per cent of all accidents occur at slow speeds. It is not the car or the speed that is dangerous; it is the road and the driver. Think of speed in terms of airplanes and trains. All of the former and many of the latter exceed our automobile speed with the utmost safety. They, too, only fail when the roadbed fails. To obtain safety then, we must provide a substitute for the human factor that causes accidents by fatigue, too slow reflexes, indecision, wrong judgment.



1960?

"Highways can be designed fool-proof—you could drive your car with your hands off the wheel—if the roads were designed for it. You could pass through a one-level intersection without slowing down or without risk of a collision in an automatically controlled car-and-road system.

"In Grand Central Terminal there is a train dispatcher who feeds hundreds of trains from forty-eight tracks into four tracks without interference, by controlled speed and spacing. The same thing can be achieved on one-level intersection without traffic lights or cops. We call this our infiltration system. Lines of cars, any number, approaching from right-angle directions can pass through each other in complete safety by being mathematically spaced by automatic control.

"Car-speed control will probably be by button on the wheel. It will be more accurate than shifting gears, accelerating or braking. Two years ago you dialed your radio to get a station; today you press a button.

"There will be no intermediate speeds

(*Concluded on page 42*)

Hatch Rewarded for Careful Roadside Work

(*Continued from page 9*)

of 1 x 5-inch boards laid on edge between 2 x 3-inch stakes driven 2 feet into the ground. The upper edge of the boards was at, or a trifle below, the finished grade of the sod.

All of the slopes were well rounded before sodding or loaming. On the slopes to be sodded, a 3-inch layer of loam was first spread. Sod was then laid, unrolling the strips parallel to the slope checks, and securely pegged in place.

On slopes loamed in preparation for autumn seeding by state forces, wide strips of sod were laid parallel to the ditch lines, with uniform spaces between strips. All sodded gutters were well graded to blend into shoulder backslopes and cut slopes.

The sod was cut by hand in strips 1 foot wide and from 4 to 6 feet long. The strips were then rolled to facilitate handling and prevent breakage. For cutting and lifting the sod, Mr. Hatch had a useful tool made by cutting the blade of an ordinary square spade into a V shape, with the point at the bottom, and sharpening the sides.

The noteworthy features of the sodding operations on this job were the excellence of the subgrading, including the transitional flattening of the slope grade at the ends of the cuts from 1 on 2 to the flatter grades of the existing ground; the manner in which the strips were laid snugly together; and such evenness of laying and tamping that the completed surface appeared wholly natural.

Meet Mr. Hatch

M. E. Hatch has been a construction superintendent in the state of Maine for the past 20 years. When not engaged on construction projects, he likes to spend his time hunting, as the photo on page 4 testifies.

When notified that he had won an Award, Mr. Hatch expressed great surprise, saying that the work had been done with no thought of any competition but that he greatly enjoys his work and that Ralph Giovannucci, contractor for this project, takes great pride in having his work done well. It is apparent that Mr. Hatch also takes pride in a good job well done.

Sours of Ohio Elected President of A.R.B.A.

Hal G. Sours, Assistant Director and Chief Engineer of the Ohio Department of Highways, was elected President of the American Road Builders' Association at the 37th Annual Convention and Road Show held in Chicago January 29-February 2. Mr. Sours was unanimously chosen to succeed Murray D. Van Wagoner, Michigan State Highway Commissioner, and will take office at the annual May meeting of the organization in Washington, D.C.

Born on a farm in Manchester, Ohio, the 46-year-old president-elect is a graduate of the University of Akron. Following his graduation he engaged in the private practice of engineering until 1919. From then until 1924 he served the state highway department as maintenance and resident engineer in Summit County, when he was elected Summit County engineer and was reelected in 1928 and 1932.

Mr. Sours has been active in the A.R.B.A. for the past 12 years, and is a former president of the County Highway Officials' Division and member of the Board of Directors. For the past year he has been a member of the Executive Committee, the A.R.B.A. policy-forming group. He has also served as president of the Ohio Engineering Society, director of the Ohio Society of Professional Engineers, president of the County Engineers Association of Ohio and member of and chairman of the Ohio Engineers Registration Board. He is a member of the American Society of Civil Engineers.

Use and Installation Of New Flat-Base Pipe

Flat-base reinforced concrete pipe has many applications in the construction field as it may be used for culverts which can handle sudden and excessive flood waters, giving a maximum run-off with a minimum rise in water level. When headroom is limited, the flat-base pipe gives the most water area for any given clearance as it can be placed close underneath a track or highway. It also permits easy support on pile bents because of the character of the base, making it excellent for outfall sewers.

This type of pipe can be installed under a railroad or highway to provide a pedestrian underpass, and by this method of construction, traffic delays and accidents can be reduced to a minimum.

Each piece of Massey reinforced flat-base pipe, made by Massey Concrete Products Corp., Peoples' Gas Bldg., Chicago, Ill., and 50 Church St., New York City, and described in detail in catalog Series C No. 1, has a 2-inch lifting hole in the top for convenience in handling and placing. In lifting the pipe, a timber, not less than 12 x 12 inches, is used cut to fit the contour of the pipe and with a length equal to 75 per cent of the diameter of the arch with an eye bolt of sufficient size to carry safely the weight. A crane can handle the pipe readily and quickly.

Further information regarding this pipe may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Installing 91 x 91-inch flat-base pipe on the Bouck Street sewer project in Albany, N. Y.

Bureau of Reclamation Photo

A section of the belt conveyor system for handling aggregate for Shasta Dam, showing the Chain Belt idlers in place.

Longest Belt Conveyor Installed for Shasta

Subcontracts for the longest belt conveyor system ever installed were recently awarded by the Columbia Construction Co., Inc., of Redding, Calif., sand and gravel contractor, to carry the aggregate for the construction of Shasta Dam which is being built by the Bureau of Reclamation as part of the Central Valley Project in California.

The Chain Belt Co. of Milwaukee, Wis., has the subcontract to furnish over 16,000 Rex troughing and return belt idlers, while the Goodyear Tire & Rubber Co. of Akron, Ohio, will supply 20 miles of 36-inch wide 6-ply belting for the system. In manufacturing the idlers, Chain Belt used about 18 miles of steel tubing, 11 miles of steel shafting, 10.5 miles of angle iron, 50,500 malleable castings, and 83,000 anti-friction roller bearings. The conveyor terminals, including alloy shafts, extra heavy bearings, take-ups, and specially constructed steel pulleys, were designed by the Link-Belt Co., Chicago, Ill. This terminal machinery has been standardized to such an extent that the need for spares has been reduced to a minimum.

This 9.6-mile conveyor system, which is between Redding and Coram, California, is being erected on wooden bents varying in height above the ground from 4 to 90 feet and is composed of 26 individual belt conveyors. These 26 links in the system will each be motivated by a 200-hp motor, except for three down-grade units which will be self-operating and will generate power due to the weight of the material on the slope.

The course of the system extends through the middle of a 100-foot right-of-way, cleared through manzanita brush its entire length, and crosses the Sacramento River at two points, one main state highway and five county roads, four creeks and the main line of the Southern Pacific Railroad. In several places the conveyor system deviates from the straight line of haul in order to avoid hilltops.

The capacity of this transportation system will be 1,100 tons an hour. While moving at a speed of 550 feet a minute, the material will be in transit on the conveyor 1 hour and 40 minutes. The greatest daily requirement of aggregate at the dam site will be 22,000 tons and the conveyor working at capacity can deliver 26,400 tons in a 24-hour day. The system will operate on a 24-hour daily basis and build up reserve supplies of aggregate at the dam, rather than attempt to match daily requirements. Four years of operation will be required to meet the total demands of the dam construction project which is estimated at 10,000,000 tons of aggregate.

The system, when completed, will be illuminated for its entire length with sodium vapor lights, to make continuous operation at night possible. There will be telephone stations at numerous points along the system and a motorized patrol will be on duty at all times. An interlocking self-control arrangement will stop the entire conveyor if anything should interfere with operation of any one unit. This interference will be indicated on a central control panel.

During the rainy season, a temporary cover will be built over the entire system to keep the aggregate from getting wet while in transit.

News of Road Equipment

The January issue of "Adams Pictorial News", an 8-page rotogravure paper issued by the J. D. Adams Co., Indianapolis, Ind., contains a large number of interesting job photos showing the latest models of Adams equipment in service. Contrasted with the 1940 streamlined models of its motor graders is a picture of the first grader made by Adams which is still in service in Jefferson County, Wis.

Other equipment depicted are the Adams terracers, elevating graders, the new tamping rollers featured by their removable and replaceable feet, and hauling scrapers in 3, 5, 6, 8 and 10-yard sizes, shown on a variety of jobs.

Copies of the "Adams Pictorial News" and complete information on any or all of this equipment may be secured by contractors and state and county highway engineers from J. D. Adams Co.

Non-Metallic Bearings As Service Replacements

Moulded non-metallic bearings which have the advantages of perfect highly polished wearing surfaces and low frictional coefficients are produced by the Gatke Corp., 228 No. LaSalle St., Chicago, Ill., for use in many industries where heavy service is the usual thing. Gatke bearings are made for water lubrication, oil or grease lubrication, and self-lubrication and are available in general diameters ranging from ⅛ inch to 40 inches or larger, and may be moulded to exact dimensions for replacing metal bearings in existing equipment without altering chucks or bearing holders.

Further information regarding these non-metallic moulded bearings will be found in Form H. B. 503 which may be secured direct from the manufacturer. Gatke will also be glad to supply details on replacements which are claimed to offer three to eighteen times the life of conventional metal bearings.

Grading New Route On Rolling Plains

Brown & Root, Inc., Build Grade for U. S. 90 West Of Sealy, Texas

♦ TO relocate the heavily traveled U. S. 90 and save about 11 miles between Houston and San Antonio, the Texas Highway Department has built a new bridge over the Brazos River at San Felipe on State Highway 73 and graded the same highway to the west of Sealy, making the entire mileage saving in the first 70 miles of cross-country driving between the two major cities of southwestern Texas. The contract for the grading was awarded to Brown & Root, Inc., of Houston and Austin, Texas, on the low bid of $49,278.12 for the 8.299 miles. The work was started December 27, 1938, with 160 working days allowed. Included in the work was 83,333 yards of road excavation and 54,527 yards of borrow, as well as a number of drainage structures.

While there were several long cuts in the rolling country, the fill predominated, resulting in the high yardage of borrow. Much dirt for the crown came from the ditches which have a front slope of from 5 to 1 to as little as 10 to 1 and blackslopes of 4 to 1. On high fills the slopes are 3 to 1. The ditch bottom on cuts is a minimum of 2 feet wide and up to 25 feet, depending on the amount of borrow required in the adjacent embankment. The road is graded with a 36-foot crown on a right-of-way varying from 120 to 200 feet. At times, when suitable material from the ditch was exhausted for the embankment and the haul would have been excessive, the plans provided for additional material by digging stock tanks for owners of adjacent property to collect water for the cattle which abound in this section.

There were only four curves in the entire contract, two of 1 degree and two of 15 minutes. These are so slight that no widening nor superelevation of the curves was required even for the high-speed traffic that will eventually use this shortened route. The curves were necessary only to by-pass one house and to avoid larger cuts. There are seventeen culverts on the project, varying from a 3 x 1.5-foot single-barrel concrete culvert to a multiple 6 x 5-foot four-barrel culvert. There are also three bridges under another contract, one near each end and one at about the middle of the work. These are 200, 240 and 600 feet in length, all with 40-foot I-beam spans carried on precast concrete piling.

Dirt-Moving Outfits

The contractor had two complete dirt-moving outfits on the job, one a dragline loading to six trucks and the other a LeTourneau Carryall scraper pulled by a Caterpillar D8 diesel tractor. The Northwest dragline was used with a ¾-yard Northwest dragline bucket, making a 10-foot cut in a borrow pit along the west bank of Crooked Branch. The borrow was sand and clay with about 30 inches of top soil. On one section where the borrow was running too high in clay the top 18 inches of the embankments at Crooked Branch was constructed of granular soil hauled from a roadway cut about 1,000 feet east of the river. This 18 inches of sand cover for the fill gave increased overhaul but produced a far better completed job. In the borrow pit the whole area was reshaped with a 3 to 1 slope and the bottom leveled to facilitate measurment of the borrow and to permit permanent good drainage.

The 12-yard Carryall scraper was used east of Crooked Branch, as well as in other sections, but the description here is of the work around that particular section. Two sheepsfoot rollers were used on the fills, one made by W. E. Grace Mfg. Co. of Dallas, Texas, and the other of unknown origin. One was pulled by a Caterpillar D7 tractor and the other by a T-40 TracTracTor. The fills were well shaped both during and after the rolling with a 12-foot Adams leaning-wheel grader pulled by a Sixty tractor.

Working a 10-hour day the two dirt-moving outfits moved a total of 2,000 yards of material a day with hauls averaging 1,000 feet and with a maximum of 2,000 feet. There were three major fills on the project, one about 312 feet in length and running from 5 to 12 feet high, one 1,900 feet in length and 1 to 9 feet high, while the other was 2,800 feet long and from 1 to 13 feet high.

Personnel

The contract was in charge of R. C. Hughes as Superintendent for the contractor, Brown & Root, Inc., of Houston and Austin, Texas, and for the State Highway Department the work was under the supervision of Bert Hedick, Resident Engineer.

Sewer Trench Rushed To Beat Time Limit

(*Continued from page 2*)

I-R portable compressors for driving four R30 sheeting hammers and a 4-inch Gorman-Rupp self-priming centrifugal for handling all the water in the trenches in clay sections.

Steel Forms for Concreting

For the concreting of the elliptical-section sewer 5-foot Blaw-Knox steel forms were used made up into 10-foot sections for lowering into the trench and then into 20-foot units for moving on the traveler. Matz used 60 feet of these forms on this job, pouring 60 feet of invert ahead and then following with the monolithic arch, using the steel forms. The sewer required 1.7 cubic yards per foot for the arch and 1 yard per foot for the invert. The travelers ran on industrial track and were pulled ahead by a hand winch.

All of the concrete for the work was furnished by the Boston Sand & Gravel Co. and was delivered in 4-yard Jaeger truck mixers as required.

Personnel

This section of the North Metropolitan Trunk Sewer was handled by Edward Walsh as Superintendent, with Edward M. Matz watching the work closely. Robert Bowes was Resident Engineer for the Sewerage Division, Metropolitan District Commission, of which Joseph P. Dever is Chief Engineer, and Joseph N. Fish as Resident Engineer Inspector.

Varied Grading Methods On Turnpike Project

(*Continued from page* 1)

40-hour week. On each shift was one operator for each scraper, a loading foreman and a dump foreman, making a total of six foremen employed.

Jacobson & McKinley Co., Pittsburgh, Pa., did all of its grading with twelve Heil Dig-N-Carry 12-yard scrapers and four Austin-Western 12-yard scrapers, each pulled by a Cletrac 100-hp Model FD tractor. The work in this portion was practically all in disintegrated shale which it was possible to break up with two rooters, one Austin-Western pneumatic rooter equipped with a Wisconsin motor and the other a LeTourneau, both pulled by D8 tractors. The cuts in this material were all made on a ½ to 1 slope.

On the fill the material was spread in 8-inch layers and then triple-rolled by six Buffalo-Springfield 10-ton 3-wheeled rollers, working one behind the other, in pairs. The Turnpike's specifications require one 10 to 12-ton 3-wheel roller on a fill for each 175 yards of material delivered to the fill per hour. A Gar Wood bulldozer on a 62-hp Cletrac diesel tractor aided in spreading the material ahead of rolling.

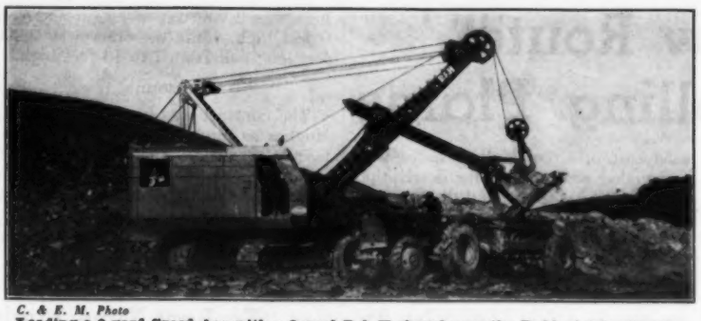
For lighting the operations, both excavating and on the fill, as well as to permit the three groups of grease-monkeys who worked the three shifts to carry on their work at night, the contractor had skid-mounted light towers equipped with Electro Dynamic generators driven by LeRoi engines with four 500-watt floodlights mounted at the top of 12-foot pipe masts on the platforms. In addition to these, four carbide flares were used on the slopes for spotlighting.

To insure continuity of operation three large fuel-oil tanks mounted on skids were kept at various points on the grade and equipped with hand rotary pumps so that any piece of equipment could be fueled quickly. In addition, a Hobart electric welder was kept on the job to make repairs instantly. "Bert" Jacobson acted as Superintendent for Jacobson & McKinley, Pittsburgh, Pa., on this subcontract.

The McKenzie Co., Dearborn, Mich.

The McKenzie Co. of Dearborn, Mich., was subcontractor on the 200,000-yard cut 50 feet deep and including a 1,400-foot relocation of U.S. 30. This contractor worked two 1¼-yard Northwest shovels with Amsco buckets and one Bucyrus-Erie 1-yard shovel on U.S. 30, loading to two LaPlant-Choate crawler wagons in tandem, two single Euclid crawler wagons, single LaPlant-Choate and Athey crawler wagons and six Koehring Dumptors. All of the dirt-moving equipment was hauled with D7 and D8 Caterpillar tractors. In addition, a Caterpillar Seventy gas tractor with a LaPlant-Choate bulldozer worked on the fill, spreading it uniformly. With this outfit McKenzie moved 73,000 cubic yards of rock in 35 calendar days, from which must be taken out Sundays, holidays and the parts of Saturdays which they could not work because of 40-hour week limitations.

On this work the shovels were run two 8-hour shifts and the rock drills three 8-hour shifts a day. There were two Ingersoll-Rand wagon drills and one Gardner-Denver wagon drill putting down 18-foot holes. These were drilled with 2¼ to 2⅛-inch Ingersoll-Rand Jackbits. The Jackbits were sent to Pittsburgh for sharpening instead of doing this on the job. The holes were put down on approximately 5-foot centers. The drilling equipment was run from a single Ingersoll-Rand 315-cubic yard gas portable air compressor. The holes were loaded with Burton, National and du Pont 40 and 60 per cent gelatin dynamite with National or Hercules exploders and fired with a blasting machine.



C. & E. M. Photo
Loading a 9-yard Speed Ace with a 2-yard P & H shovel near the Bedford interchange, Herman Holmes, contractor.

For the McKenzie Co., Dearborn, Mich., H. A. Morse was Superintendent.

The Herman Holmes Section

Herman Holmes did the work on 8,700-foot grading Section No. 6, a side-hill cut just east of the Bedford interchange and including one ramp of the interchange which required over 66,000 cubic yards of excavation out of the total of 490,000 cubic yards in Section 6. This was the largest grading section and had to be done entirely by benching.

The contractor cut a series of benches across the face of the side-hill cut, making the top one with a shovel and merely casting the material downhill. The other three were made with bulldozers and merely served as facilities for moving the equipment. The major cut was made by the scrapers which dropped the pans to act as brakes as they came downgrade. On this work Holmes used two Austin-Western 12-yard scrapers and four Gar Wood 15-yard scrapers, all pulled with Allis-Chalmers tractors and using another A-C tractor as a pusher during loading. Two LeTourneau 12-yard Carryall scrapers were also used, pulled by Caterpillar D8 tractors. At the top another Caterpillar tractor with a LeTourneau bulldozer was used to maintain the turns and act as a pusher.

In placing the fill, the original ground slope was benched to a depth of 12 or 18 feet and then the 1½ to 1 fill spread and rolled. Where rock was encountered a 1 to 1 slope of rock laid flat by hand as a retaining wall was used on 12-foot benches. The surface of the fill was maintained by a TD-18 International

(*Concluded on next page*)

Rock and Earth Moved On Turnpike Section

(Continued from preceding page)

tractor with a Bucyrus-Erie bulldozer.

East of the cut just described and immediately west of the large Bedford interchange, Holmes operated another grading section himself with a P & H 2-yard shovel with an Amsco bucket loading to three 9-yard Allis-Chalmers Speed Aces and three trucks, with an average haul of about 600 feet. With this outfit he moved an average of 800 yards per 7-hour shift. Where rock was encountered, an Ingersoll-Rand compressor and wagon drill and several jackhammers were used for drilling the 10 to 12-foot holes. Two Ingersoll-Rand air tampers were used on pipe backfill where drainage lines were installed. Two 10-ton Buffalo-Springfield 3-wheel rollers were used on the fill, which was maintained with an International TD-18 tractor and Bucyrus-Erie bulldozer.

Equipment Requirements

The Pennsylvania Turnpike Commission, when asking for bids on any section, set up the equipment requirements which their engineers felt were necessary to complete that work in the contract number of calendar days. Contractors bidding were required to furnish the list of their equipment which had to match the list of equipment furnished by the Turnpike engineers or equivalent equipment had to be used. Thus, if the Turnpike list showed that one 2-yard shovel would be required for the work and the contractor chose to use carry-scrapers he was required to put four such scrapers of 12-yard capacity on the job, which allowed for one being down temporarily for repairs, as the Turnpike engineers considered that three 12-yard scrapers were equivalent as excavating units to one 2-yard shovel.

C. J. Garvey was General Superintendent for Herman Holmes on this work, and for Contract 43, Section 12A, R. W. Sieber was Resident Engineer for the Pennsylvania Turnpike Commission.

Self-Loaded Scraper With Positive Dump

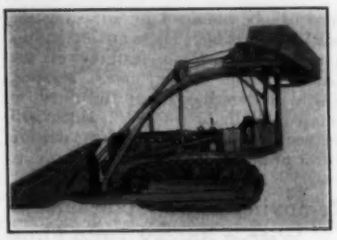
The new positive-ejection Carrimor scraper, developed by LaPlant-Choate Mfg. Co., Cedar Rapids, Iowa, has a number of interesting features. It is cable-operated through ball-bearing sheaves which are kept to the minimum number to reduce cable wear. The front apron moves out and up clear above the load if desired to permit dumping sticky or bulky material. A positive cable pull down permits closing this apron quickly to hold the load for travel. The Carrimor scraper has a positive power pullback on the rear gate. While this gate in normal work returns automatically without springs merely by releasing the brake, it has this positive power pullback for use if needed in extreme conditions. The push-out gate is curved to facilitate loading and dumping. This curvature helps to lift the load going forward and reduces the push-out resistence in dumping.

The new Carrimor scraper announced at the Road Show.

The rear of the bottom of the pan on this scraper is not elevated, which permits using a deeper bowl and gives more of the load at the back. The seat of the bowl, when the pan is raised for transporting, has a normal ground clearance of 15 inches. Greater clearance can be obtained by adjusting the bowl-lifting cable. These are among the numerous interesting features of the LaPlant-Choate Carrimor scraper, which is described and illustrated in detail in Bulletin A-09-618, which will be sent promptly to readers writing direct to the manufacturer.

Removing Snow Completely With a Rotary Type Plow

Snow cannot be continuously pushed back to the shoulder when there is a succession of hard storms. This is where a rotary snow plow comes into action because it can remove the snow, casting it far into the fields. The latest bulletin of Klauer Mfg. Co., Dubuque, Iowa, shows the newest model of the Klauer Snogo, which speeds snow removal from highways and can be adapted to city use with a special truck loader. Copies of this bulletin will be sent free on request to those applying to the manufacturer and mentioning this item.



The new Athey MobiLoader.

New Loading Unit At A.R.B.A. Show

One of the entirely new pieces of equipment which made its debut at the A.R.B.A. Road Show in Chicago was the Athey MobiLoader, recently developed by the Athey Truss Wheel Co., 5631 W. 65th St., Chicago, Ill. Mounted on a D4 Caterpillar diesel tractor, the new Athey MobiLoader is a utility loading tool designed for use by contractors, and state, county and township highway departments.

The MobiLoader shown at the Road Show has a 1½-yard bucket. It is cable-operated, and is a ball-bearing-mounted worm-gear transmission unit. Control is from the tractor seat and is very simple, one lever controlling all rear dumping, and front dumping being obtained by a simple adjustment. There is a 7-foot 6-inch clearance under the chute for rear dumping, and for front dumping the load can be discharged at any point from the ground to a height of 7 feet 6 inches.

Power is transmitted from the front power take-off to a reversing transmission and worm gear unit mounted on the left-hand fender. The drawbar of the tractor is left clear to permit the tractor's use for other purposes, or for mounting a winch. To mount the MobiLoader, no changes are necessary either in new Caterpillar diesel tractors or in corresponding models now in use. No special mountings of any kind are needed, and it can be attached without boring any holes.

One of the features claimed for the Athey MobiLoader is that it allows clear vision for the operator, since there is no structure in front of the driver to obstruct his view. In addition, it does not interfere with the operation of the tractor tracks, but leaves them free to oscillate normally. In operation, the MobiLoader dumps to the rear without the necessity of maneuvering or turning the tractor in anyway.

It is reported that, in actual tests, it required 10 seconds to lift and dump the loaded bucket, and 5 seconds to return the bucket.

Complete information on this entirely new loading unit, the Athey MobiLoader, may be secured by those interested direct from the manufacturer by mentioning this magazine.

Spring-Tooth Mixer To Work with Blades

On oil mat or bituminous roads and clay-sand stabilized base roads after the lateral mixing has been completed with graders, an Ariens Aggmixer may be used to complete the mixing. This is a two-wheel unit, carrying a hexagonal shaft driven from the power take-off of the hauling tractor. On the shaft are the tines and spring teeth which are rotated to give the mixing effect.

The Ariens machine is made in four models giving a mixing width of 4 to 7 feet and having an overall width from 79 to 118 inches. In this machine the spring mixing tines are replaceable with discs which may be used instead of the tines and springs for certain special mixing operations. Complete information may be secured from Ariens Co., Brillion, Wis., by mentioning this item.

Form Clamps and Tie Rods For Concrete Construction

There are many short cuts and easy ways of handling form work for concrete construction. Many of these are included in Pamphlet No. 44 which has been issued by the Williams Form Engineering Corp., Box 925, Madison Square Station, Grand Rapids, Mich. This pamphlet is entitled "Kinks & Clamps" rightfully because it shows many easy ways of handling various form problems, as well as including two sets of tables for the economical designing of forms.

Copies of this pamphlet will be sent free on request to readers mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Rolls of tarred felt were spread on the subgrade on a Minnesota experimental concrete paving job.

Tarred Felt Used On Minn. Paving Job

A new wrinkle in highway construction, designed to take the wrinkles out of the road, is being tested by the Minnesota Highway Department on a 3.4-mile stretch of new road on Trunk Highway 12 at its east approach to St. Paul. The contract, on which work was started last autumn, called for the construction of two 22-foot lanes of 9-7-9-inch concrete, with the opposing lanes of traffic separated by an island. The job was awarded to the Clement F. Sculley Equipment Co. of St. Paul on its low bid of $184,021.

The experiment consists of an interesting method of reducing subgrade friction and shrinkage loss through the use of tarred felt spread on the subgrade. Subgrade friction, when the concrete does not have a smooth plane to expand and contract upon, is believed to be responsible for most of the cracks which have appeared on Minnesota's concrete highways.

On this project, just before the concrete was poured, rolls of tarred felt were spread over the subgrade. Strong enough to stand the abuse of workmen walking about on it without its tearing, this material is wholly saturated with bitumen. Research by the State Highway Department indicates that the use of tarred felt will not only decrease subgrade friction but also will keep the water in the concrete until it sets up, thus decreasing shrinkage loss. The tarred felt used on this experimental stretch was manufactured to State Highway Department specifications by the John Leslie Paper Co. of St. Paul.

The Minnesota Highway Department has conducted extensive field and laboratory tests on this type of tarred felt and believe that it will provide a simple solution to one of the Department's most troublesome maintenance problems. The rolls of tarred felt used on this project were of the standard tar-paper width but it may be practical, if this experiment proves successful, to use a wider width roll to facilitate handling.

New General Sales Mgr. For Buckeye Ditcher Co.

The Buckeye Traction Ditcher Co., Findlay, Ohio, has announced the appointment of Paul B. Cochran as General Sales Manager. Mr. Cochran is widely known in the construction equipment industry for his many years of active sales work, especially during recent years as Sales Manager of the R-B Equipment Division of Buckeye while that office was in Chicago.

The new appointment places Mr. Cochran in charge of sales of all Buckeye equipment, moving his headquarters to the general office in Findlay, Ohio.

Want information? Write the Editor.

Better Lubrication Or More Worn Parts

Lubrication is the life-saver of machinery. It is much cheaper for any operator of road machinery or equipment on heavy construction to spend a few cents a pound more to secure the best lubricant and the right lubricant for each part of a tractor than it is to spend many dollars a pound for replacing worn parts in the machine.

D-A Lubricant Co., Inc., Indianapolis, Ind., one of the oldest and largest companies in the United States specializing exclusively in lubricants for tractors and trucks, has issued a chart giving the grades of lubricants recommended for various makes of tractors in extreme heat, summer, mild winter weather and zero weather and the same data for heavy duty trucks, and light trucks and passenger cars.

A copy of this chart in Form 470 may be secured free direct from D. A. Lubricant by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Equipping a Job For Smooth Work

Western Contracting Co. Had Special Floodlight and a Grease Outfit on Grading Near Bricelyn, Minn.

(*Photos on page 48*)

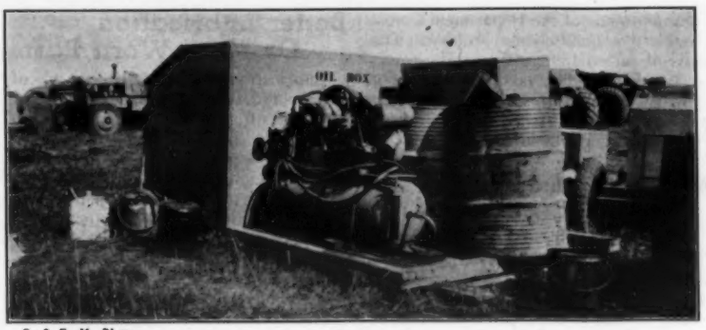
✦ IN preparing for a 6.8-mile grading, paving and shouldering contract 12 miles east of Blue Earth, Minn., on U.S. 16 last summer, the Western Contracting Co. of Sioux City, Iowa, was faced with a problem. The company had been successful as low bidder on some dozen highway contracts and was working all of them at top speed, while subcontracting one or two. When it came to equipping the job mentioned above, a good scraper job, all the company's scraper outfits were busy elsewhere. As a substitute, a fleet of six Allis-Chalmers Speed Ace wagons and a Lima dragline with a 50-foot boom and a 2¼-yard Page bucket were put in and surprised everyone with the way the job went along.

After stripping the roadside borrow pits with a Caterpillar No. 12 Auto Patrol the Lima stepped in, having done some shouldering in the meantime, and kept the Speed Aces hustling with black dirt for stockpiling for later slope dressing and then loading out borrow for raising the grade. So that the work could be continued late into the evening on double shifts, the dragline was equipped with a 1,500-watt Kohler light plant. Aiding in the usual manner was a Caterpillar Seventy-Five with a LeTourneau bulldozer.

The Floodlight Outfits

A pair of very effective floodlight outfits was allotted to this job to speed up the night work. They are a development of the contractor and deserve special mention. The truck is a 3-wheel affair with a caster wheel at the front and rigged for towing. The frame itself is of angle irons and I-beam construction with a pipe welded across the front of the frame for rigidity as well as to provide a place for insertion of the pipe spuds to steady the unit when the telescoping tower is raised. The lower section of the pipe tower is fixed rigidly to the frame and braced effectively, while the second, third and fourth pipe sections with collars can be raised from inside the first pipe section by means of a Sasgen hand winch to give an effective height of 24 feet above the ground for the two Westinghouse Type CAK16 floodlights. These are rigged so that they can be swung in any direction separately and thereby cover the greatest possible area with a working illumination.

The electricity for the units is provided by 1,500-watt Kohler plants mounted near the back of the 3-wheel frame and the rubber insulated cord for carrying the electricity to the lights is run through a pair of multiple blocks weighted at the bottom so that the wire is never fouled or in the way.



C. & E. M. Photo

The standard greasing outfit developed by the Western Contracting Co.

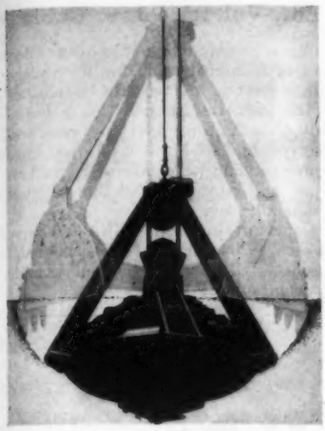
The Greasing Outfit

Second in interest but of prime importance to the effective operation of the job was the complete greasing outfit mounted on skids. The 6 x 6-inch wooden skids beveled at the ends and about 12 feet long carried a heavy plank platform 6 x 10 feet in area with the boxes of parts for the various pieces of equipment on the job. Those on the platform at the time of our visit were the parts boxes, all properly labelled, for the Allis-Chalmers Speed Aces. Then the platform carried three drums of diesel oil, all stencilled with the date when they were filled at the company's supply yard, and a large oil box containing the cans of lubricant for the equipment that it was serving. The smaller cans of Cities Service crankcase oil, etc., were arranged on shelves properly so that there was no time lost in getting at them, and on the bottom of the box were the 25-pound and larger cans of greases for the different units.

Mounted at the side of the drums of oil and behind the oil box was a U.S. Air Compressor Co. air compressor and air tank for pumping tires and for the power-operated grease guns.

Uniform Road Striping

Uniform traffic striping on highways is now being considered by the American Association of Highway Officials as the country's first set of standards for painting the roadway to show what lies ahead. This standardization is sorely needed and one of the Association's committees has recommended for adoption by every state this uniform marking for lane lines on 2 and 3-lane roads.



The new 1940 Haiss Hi-Power bucket

Clamshell Bucket Improved for 1940

Several new features and improvements in the Haiss Hi-Power clamshell bucket have been announced by the George Haiss Mfg. Co., 141st St. & Park Ave., New York City. The new 1940 features include hinge pins of increased diameter, heavier jaw plates, and teeth of a special design resulting from extensive field studies of various kinds of digging.

These heavy-duty buckets are available in 3/8-yard light, 3/8-yard standard, 1/2-yard narrow-bowl and 1/2-yard standard, 5/8-yard, 3/4-yard narrow-bowl and 3/4-yard standard, 1/2-yard, 1 1/4-yard and 1 1/2-yard models. Designed for hard digging, they are strong, tough and built to carry a full pay load all the time.

A new bulletin, No. 237, describing the features of these Haiss Hi-Power buckets, has recently been issued. Copies may be secured from the manufacturer.

New Fittings Prevent Too Much Lubrication

Lubrication with a stop signal is the latest development by the Alemite Division, Stewart-Warner Corp., 1850 Diversey Parkway, Chicago, Ill. Recently designed to prevent over-lubrication of ball and roller bearings, Alemite Lubriguards, a new line of fittings and bushings for machinery, are so constructed that they signal the operator when a bearing is sufficiently lubricated.

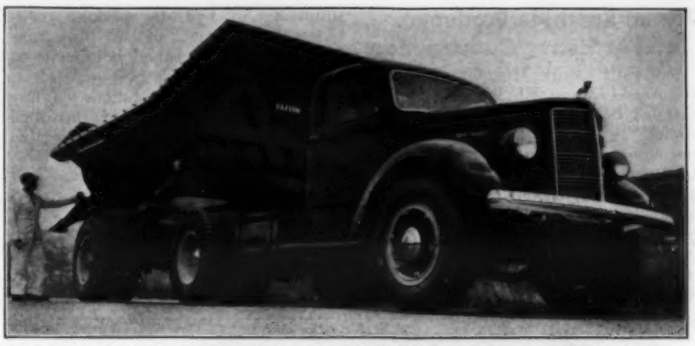
The Alemite Lubriguard fitting is installed directly into the bearing. In operation, with an Alemite hydraulic-type pressure gun applied to the Lubriguard fitting, the lubricant is forced through an inlet of the fitting and thence into the anti-friction bearing. When a predetermined amount of back pressure is developed in the bearing, excess lubricant appears at the vent, a signal to the operator that further lubrication is inadvisable. In making it impossible to cram anti-friction bearings with grease, Alemite Lubriguards save the power loss, accelerated wear, repairs, and lubricant wastage that are direct consequences of over-lubrication, the manufacturer claims.

Alemite Lubriguard bushings are another development making possible installations directly into bearings that are already equipped with the hydraulic, button-head, dot, pin-type, and other conventional pressure-gun fittings, so that the bearings may receive the Lubriguard protection without discarding the original fittings.

New Tractor-Trailer For Quarry Operation

A new combination consisting of a sturdy tractor economically powered and a rugged trailer built to stand the gaff is now being offered by Mack Trucks, Inc., 34th St. & 48th Ave., Long Island City, N. Y., for level quarry operations. This new semi-trailer combination is powered by a Model EG Mack tractor, a unit of 132 1/2-inch wheelbase, having a 3 3/4 x 4 3/8-inch engine, and built to withstand the rough going and hard knocks of quarry and similar operations through the use of oversize axles, springs, and tires.

The trailer unit of this combination is manufactured by the Easton Car & Construction Co., of Easton, Penna. The body is of the patented Phoenix type of 15 to 20 tons capacity and has 2-way side dump. No integral hoist is used, the body being tipped by a lift installed at the unloading point. The Easton trailer is of heavy construction in keeping with the body and is available with or without brakes. A practical transferring hinge arrangement and outriggers on the trailer are aids to the side dumping. Tending to stabilize the job when unloading, the ends of the outriggers are in contact with the apron over which the load spills at discharge, relieving the springs of abnormal stresses.



A new tractor-trailer unit consisting of a Model EG Mack tractor and Easton trailer.

Varied Rawhide Products For Heavy Construction

Chicago Rawhide Mfg. Co., 1301 Elston Ave., Chicago, Ill., has issued an illustrated booklet on its varied rawhide products which are used in construction equipment and on heavy construction. These include leather packings, special formed leathers, soft pneumatic leathers, leather belting, non-metallic pinions and gears, oil seals, leather protective boots, leather couplings and valve discs, washers and gaskets, rawhide mallets, mauls and hammers, belt supplies and hydralic packing, rawhide safety lacing and belt pins, rawhide belt lacings, round belting, twist belting and hand leathers.

Information and quotations on any of these products will be furnished promptly to readers mentioning this item.

New Dodge Plant Manager

Announcement has been made of the appointment of Russell H. Dragsdorf as the new Dodge truck plant manager, succeeding R. M. Hidey who died recently. Mr. Dragsdorf, who has been Dodge truck plant engineer and labor relations supervisor for the past several years, has been associated with Dodge in Detroit for 22 years.

Coincident with Mr. Dragsdorf's appointment, it was announced that A. S. Anderson, for several years in charge of the special equipment engineering department of the Dodge truck plant, has assumed the additional duties of labor relations supervisor, and Harold Hocker, who has also been connected with the Dodge organization for several years, becomes plant engineer.

Low-Voltage Power Cable

A condensed guide to aid in the selection of insulated cable for low-voltage power circuits has recently been issued by the General Electric Co., Schenectady, N. Y. This booklet summarizes the types and applications of low-voltage power cable, gives details of the various types, and information on how to select conductor sizes.

Copies of this catalog GEA-3280 may be secured by interested contractors and engineers direct from General Electric by mentioning this item.

A worn sheave groove is as bad for wire rope as a tight shoe is for your foot.

Worn Sheave Grooves Damaging to Wire Rope

Just as a tight shoe hurts the foot, so a misfit groove in a sheave or drum causes damage to wire rope. In one case comfort is sacrificed; in the other economy. The damage caused by worn sheaves, and the importance of the correct design and size of sheaves and drums are discussed in a recent issue of *The Hercules Record*, issued by A. Leschen & Sons Rope Co., St. Louis, Mo.

The illustration shows a sheave groove worn down fully ½ inch. The worn part of this groove is narrower than the original groove contour, due to the rope also having been reduced in diameter by wear. As the proper size gage does not go to the bottom of this groove, a new full-size rope put on this sheave in its present condition would be severely pinched and deformed.

You will get longer rope service and therefore greater economy by using sheaves and drums with grooves of the correct design and size. They should be large enough for the wire rope to fit into them easily without binding on the sides, but not too large, as such a groove does not give proper support to the rope. Make it a rule to check your grooves for size and condition at regular intervals, and especially before putting on a new rope.

The recommended diameter of groove for any given rope size is the nominal diameter plus a certain necessary clearance. These groove diameters for various size ropes are as follows:

Nominal Diameter (d)	Proper Groove Diameter
0—3/4	d + 1/16
13/16—1-1/8	d + 5/64
1-3/16—1-1/2	d + 3/32
1-9/16—2-1/4	d + 1/8
2-5/16 & up	d + 3/16

New Crawler Crane

A new crane designed primarily for handling and setting steel, handling piling, and similar work requiring extreme versatility as to boom position and line control has just been announced by the Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill. Known as the Model 71, the unit is crawler-mounted and has a capacity of 40 tons. Its versatility is made available by four drums, including a worm boom hoist, a combination which will take care of any steel-setting job.

The new Northwest 40-ton crawler crane

A special folding gantry that can be lowered provides ample overhead clearance when traveling under obstructions is necessary. All Northwest features, such as the Feather-Touch clutch control, cushion clutch, helical gear drive, ball or roller bearings on all high-speed shafts, uniform-pressure swing clutches, and steering with positive traction on both crawlers while turning as well as when going straight ahead, are standard equipment.

Further information on the new Model 71 Northwest crane may be secured by those interested direct from the manufacturer.

New Electric Drill

A new ½-inch capacity, light-duty, portable electric drill, known as the Thor Champion, has recently been announced by the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill. This new drill, intended for intermittent service, is adaptable for automotive and similar installation, maintenance and repair work.

The ½-inch Champion weighs only 9¼ pounds and is 15 inches overall. In addition, it is streamlined so that it can be used effectively in hard-to-reach places. One of its features is a powerful motor and extra-heavy tooth pitch gears for transmitting power to the chuck. An extra large air intake keeps the motor cool. Oil-lite bearings are used throughout except on the spindle where ball bearings are used.

Standard equipment includes a double momentary switch fully enclosed in a dustproof compartment in the switch handle, a spade handle and removable dead handle. A handy spring clip retainer for the chuck key, a three-jaw Jacobs chuck and a three-conductor cable and plug are also furnished.

Small Gravel Plant Has Large Capacity

A smaller plant for the production of crushed gravel has been added to the Duplex crushing plant line of the Pioneer Engineering Works, Minneapolis, Minn. Heretofore, these Duplex plants have only been used by producers requiring unusually large capacity. On the smaller jobs, plants with a single jaw crusher have been used. With the changing specifications requiring smaller crushed material, the single jaw crusher is not sufficient. It has been found that the combination of a small jaw crusher and a roll crusher will produce more capacity and smaller crushed material than a single large jaw crusher.

One of the new small Pioneer duplex crushing plants, owned by Lake County, Mich.

The new Pioneer 16-V crushing, screening and loading plant uses a 9 x 16-inch jaw crusher and a 16 x 16-inch secondary roll crusher. The jaw crusher takes the large rocks and the roll crusher does the secondary and fine crushing.

One of the features of this plant which increasese its capacity is the bottom deck feed, which has been used successfully on larger sizes of Pioneer Duplex plants. The bottom deck feed doubles the effective screen area and balances the work of the two crushers. It screens the pit material on the bottom deck and the crushed material on the top deck. With this screening and crushing arrangement, the plant is sufficiently flexible to meet varied conditions and can produce road gravel, reject any percentage of sand and produce stone chips for seal coat or cover aggregate.

Full details on the new Pioneer 16-V Duplex crushing, screening and loading plant, may be secured direct from Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis, Minn.

The Gardner-Denver mine car loader which is adaptable to small tunnel jobs.

Air-Operated Loader For Small Tunnels

A small car loader, operated by compressed air, which has found its widest application in mining operations, has recently been used by several contractors very effectively on sewer contracts and small water-supply tunnels. The Kaufman Construction Co. is using one of these Gardner-Denver mine car loaders on a water-supply tunnel for the City of Bethlehem, Pa., at Little Gap, Pa., and also the Tomack Subsidiaries are using one of these loaders in mucking the headings on a sewer contract at Rochester, N. Y.

With the dipper lowered in front of the machine, and a standard mine car coupled in the rear, the loader is crowded into the broken rock by one of its compressed air motors. When the dipper is full, the second motor lifts it backward over the loader and the rock is discharged into the car behind. The body of the loader may be swung to either side to handle rock outside the track on which it runs, and an automatic centralizing device brings the dipper into the proper position for discharging into the car. As the dipper empties, the loader is moved backward a short distance and the operation is repeated. With an empty car in position the actual loading time is reported to be less than one minute.

The two air motors used for operating the loader are of the five-cylinder radial type, permitting compact design, developing maximum power with a minimum size. They operate on air pressures ordinarily used in drilling operations and their consumption is about that of a medium-size drill. The operation of the machine is controlled by two levers, located on the operator's side of the machine in such a way that the operator's hands are in a natural position to give him complete and easy control of the machine.

The machine operates on any size rail over 8 pounds, but due to the weight and method of laying slide rails, it is more satisfactory to use nothing lighter than 16 pounds. The largest of the three models, the 9L, weighs 4,515 pounds, is 32 inches wide overall, 82¼ inches long with the dipper lowered, and 52¾ inches high with the dipper lowered. The machine requires a minimum head-room of 88 inches. It will clean up a space from 60 to 102 inches wide, and operates on an 18 to 30-inch gage track. It may be readily disassembled for lowering through a small shaft, which is a considerable advantage where it is desired to work from several headings.

A complete description of the loader, with numerous illustrations, diagrams and specifications, is found in a 12-page Bulletin GD-9, Third Edition, which may be secured from the manufacturer.

Hints on Handling Hose

In the introduction to a new 34-page booklet "U. S. Hose Hints", just issued by the Mechanical Rubber Goods Division of the U. S. Rubber Co., there is this statement: "The long experience of the U. S. Rubber Co. in the manufacture of every conceivable type of hose employed by industry has revealed many enlightening phases of hose destruction through abuse. We want to bring out these points openly because they are valuable to the hose user, and may be the means of completing an important job when everything depends on the proper functioning of the hose.

"With this in mind, suggestions are offered herein for increasing the service life of your rubber hose, and helping to protect it against the many elements tending toward destruction."

In addition to information on how to get more service from the various types of hose, and how to select the correct hose for specific purposes, the booklet contains information in the form of tables, illustrates the various kinds of hose construction, lists various hose terms, and explains how hose is tested before it is placed on the market.

Copies of "U. S. Hose Hints" may be secured by those interested direct from the Mechanical Rubber Goods Division, U. S. Rubber Co., 1790 Broadway, New York City, by mentioning this item.

Dollars Do Double Duty On Oakland County Roads

Pit-Controlled Gravel Mix, Treated With Calcium Chloride on Road, Is Providing Smooth Dust-Free System At Low Cost

✦ MAKING one road dollar do the work of two is an accomplishment which arouses the interest, and perhaps the incredulity, of highway engineers. But Oakland County, Mich., claims that it has found a way to double the amount of gravel placed and consolidated on county secondary roads at no increase in cost or, looking at it from another angle, has cut the cost of stabilized gravel in half.

John H. Barr, Assistant Highway Engineer, explained, "Necessity was the mother of invention. Last year 50 miles of roads were regraveled, under a WPA grant, with a well-balanced stabilized mix purchased from commercial plants in the vicinity. However, it was discovered that the project fell far short of adequately resurfacing the county's secondary roads, many of which had been badly worn by traffic without replacement of lost materials."

Oakland County's Problem

The problem facing Oakland County was to get enough gravel on these roads each year to maintain them and keep them from raveling with the resultant loss of valuable surface materials. Another aspect of the problem was the increased yardage of gravel needed for rebuilding old gravel bases. The first of these required that a stabilized mix be used. The second prohibited the use of such gravel due to its cost of $1.08 per cubic yard.

The Solution

Oakland County found the solution to this problem. From experience with the pits in the vicinity it was known that they ran a pretty well-balanced mix of fines and aggregates. It was believed that the mixture could be efficiently and easily controlled at the pits by establishing definite specifications for gravel bought for country roads, and without the special processing of pugmill mixing. It was also believed that such a system would reduce by half the price of gravel to the county and make it possible to place double the amount of yardage.

With this in mind, tests were run on the gravel in the various pits in the area and those pits selected whose materials most closely resembled that required for stabilization. Next, owners and operators were interviewed and specifications discussed with them. They were willing and eager to cooperate and the plan was put into effect.

Present Scheme of Operations

Commercial pits now furnish a high grade of road gravel for as low as 42 cents per cubic yard, which is less than half of the cost of the material previously purchased. The county stations a man in each pit to check every load and maintain the uniformity of output. When a bed runs to sand, the latter is screened out and clay added; in the case of such beds, clay is brought in and stockpiled against the need for it.

Gravel from the pit must run from 5 to 15 per cent clay, according to specifications. In pits leased or owned by the county, the gravel sometimes falls outside the allowable minimum of clay, in which cases a small per cent of clay is added on the project. The commercial producers, however, adhere strictly to specifications.

In processing this specification gravel, no difficulty is experienced with oversize material. The specifications require that everything must pass a ¾-inch screen. In gravel from commercial pits, of the material retained on a No. 4 screen, 25 per cent must be crushed. In the production of gravel in county-owned pits, all oversize must be crushed to meet specified grading.

The specifications set up by Oakland County require 100 per cent of the material passing a ¾-inch screen; 55 to 80 per cent passing the ⅜-inch screen; 25 to 40 per cent passing the No. 10 screen; and 5 to 15 per cent the No. 200 screen. The Plasticity Index must be not less than 4, figured according to the old Dow method.

The county continually analyzes samples of gravel taken from the conveyor belts to make certain that it maintains the standards set. A careful record of these samplings is made on small sheets which are kept on file for ready reference. By controlling the gravel in this manner, the necessity for adding materials and mixing on the road is eliminated. All that need be done is lay out the materials on the surface and apply calcium chloride. The result is a fine job of consolidation accomplished for small cost.

No water is added with the calcium chloride when it is placed on roads that have been previously consolidated. On other roads, the surface is sprinkled before the calcium chloride is spread.

System Proved Successful

Mr. Barr states that to date this system has proved highly successful. The roads upon which pit-controlled gravel has been used have stood up well under traffic wear, are easily maintained, require less blading, and are free from dust. By using this method, the county is able to get 6 to 8 inches of consolidated gravel into the base instead of 3 to 4 inches.

Pit owners and operators have also been enthusiastic. They claim that this system gives them more county business, costs them less and gives them a better margin of profit.

The Oakland County Road Commission is asking for 100,000 yards of this pit-controlled gravel mix for its roads this year. Its low cost, combined with the conservation of road materials by calcium chloride treatment, will affect great savings of taxpayers' money and at the same time give the county an excellent system of smooth dust-free roads.

The importance of lubrication can't be stressed too often. If you have any problems, write the Editor.

Concreting Feature Of Texas Bridge Job

(*Continued from page 2*)

bank piers have a 9-foot radius nose both upstream and downstream. These piers were carried down to 60 feet below the bottom of the stream bed or a total depth of approximately 90 feet. The piers do not have a bearing foundation but depend on side friction for most of their stability.

The caissons were poured and sunk with remarkable uniformity and little side movement but when there was a slight movement out of line on the east bank piers the caisson forms were brought to line by a ¾-inch cable and a steamboat ratchet. The caisson forms were held with Universal Form Clamp Co. clamps using ¾-inch rods and both cones and sleeves.

Concrete Plant and Water Supply

The water supply for the concrete was secured by means of a 4½-inch x 20-foot wellpoint driven in the river bank and the water pumped with a Fairbanks-Morse pump driven by a Fuller & Johnson engine to a 10,000-gallon horizontal tank on the approach fill east of the east bank pier. The water taken by the wellpoint was remarkably clear, considering the turbid character of the river water.

The aggregates were weighed in a Butler batching plant located about 300 feet east of the east bank pier and served by a P & H crane and clamshell unloading sand and gravel from cars on a temporary spur track. One batch truck was all that was needed, or that there was room for, to handle the batches to the Rex 27-E paver set up on blocks even with the east bank pier and adjacent to the cement shed. The door of the cement shed opened at the skip of the paver so that the six bags of cement could be easily emptied into the skip. Because of the character of the sand used, the contractor found it advantageous to substitute 5 per cent by weight of the regular concrete sand with a very fine river sand. This was weighed out in the cement shed. The standard dry batch weights were: 1,938 pounds of gravel; 1,208.4 pounds of regular concrete sand; 63.6 pounds of fine river sand; 564 pounds of cement (six sacks).

Moving the Concrete

Perhaps the most novel part of this contract was the manner in which the concrete was handled for the three piers. The control of the water in the concrete was the pride of the Superintendent who pointed out that in pouring a 20-foot lift of a caisson there would not be enough water gather at the surface to fill a 5-gallon can.

For pouring the east bank pier, the boom of the paver was removed and an open grid platform of 2 x 4's on edge built immediately in front of the drum to place a 30-cubic foot Blaw-Knox rollergate bucket for filling. This was handled by the Bucyrus-Erie crane blocked up between the paver and the bank caisson. The bucket was slowly emptied into a hopper leading to an elephant-trunk chute. The concrete in all the caissons was vibrated with Chicago-Pneumatic air-operated vibrators with a condenser in the air line to keep water out of the vibrators.

When pouring a lift in the river pier the paver boom was attached as for normal paving operations and then extended 30 feet by means of an I-beam carried on a heavy timber framework. A sheave and longer cable made it possible for the paver bucket to be run out the entire distance and then dumped into a hopper at the top of an Insley half-round chute supported in a most unusual manner. When it came time to run the chute down the slope to the buckets on the barge, the Superintendent looked around for a suitable beam around 40 feet long which could act as a stiffener for the chute. There was nothing at hand except a couple of the Inland steel sheet piles so these were pressed into service by placing them on edge, putting blocks between them and brackets on either side and suspending the chute below by stirrups. The chute delivered the concrete into a wooden hopper from which the buckets on the barge were filled. Three buckets were used in the concreting of the river pier, one bucket being left at the pier on each trip to save time in returning to the chute for more concrete. The barge used measured 18 x 30 feet and was propelled by an old gas-engine-driven hoist which reeled in on a light cable attached to the two banks. The concrete was handled at the river pier by the same Link-Belt crane used for excavating the dredge wells.

When it came time to concrete the west bank pier, the barge ran across to the west shore and a stiffleg steel derrick on the west bank picked up the buckets and made the pour. This same derrick handled the form panels and clamshell for excavating the caisson.

With this concreting outfit the contractor was able to pour twenty-three batches an hour.

The Compressed Air Plant

While the early part of the excavation in the three piers was done in open air, as soon as the work progressed so that the cutting edges were 20 feet into the ground the contractor found it easier to control the caissons by working under compressed air. For this purpose a rather complete compressed air plant, hospital lock, and air lines were installed. The air lines were run as a pair of 4-inch lines along the railroad bridge 200 feet upstream of the river pier and then laid on the bottom of the river to the pier. Later the lines were extended to the west bank in the same manner.

A standard construction shed, measuring 18 x 45 feet, was erected to house two steam boilers and two steam-driven horizontal single-stage Gardner-Denver air compressors delivering 850 cubic feet per minute at 160 rpm. These compressors furnished the low pressure air at about 35 pounds pressure although they were built for high-pressure air. An 8,000-gallon fuel oil tank outside the building furnished the fuel for the boilers. The hospital lock was installed at the far end from the boilers under the same roof.

Major Quantities and Hours

In order to get the work through as quickly as possible because of the trouble experienced with the rapid rise of the Brazos River at times of rain, the contractor ran the job with a full quota of men, and work on the river pier was handled in two 10-hour shifts and the work on the other banks piers from "can to can't" or during daylight hours.

The major quantities on the project, FAP 805-I(1) on State Highway 73, which will become a section of U. S. 90 as soon as other projects on this straight-line route from Houston toward San Antonio are completed, were:

Item	Quantity	Unit Price
Unclassified structural excavation (piers)	7,450 cu. yd.	$ 6.50
Class A concrete, roadway	610 cu. yd.	25.00
Class A concrete, caisson	3,541 cu. yd.	25.30
Class A concrete, shafts	488 cu. yd.	20.00
Class A concrete, bents	53 cu. yd.	19.00
Class E concrete, seal	589 cu. yd.	18.00
Reinforcing steel	364,418 lb.	.05
Structural steel	223,320 lb.	.0522
Structural steel (trusses)	1,590,000 lb.	.0728
Structural steel (cutting edge)	127,200 lb.	.12
Precast concrete piles, 18 inches square	1,910 ft.	3.50
Total bid for the completed structure		$345,487.79

Personnel

The contract for the construction of the substructure and superstructure of the Brazos River Bridge at San Felipe, Texas, was awarded to Brown & Root, Inc., of Houston and Austin, Texas, on its low bid quoted above. For the contractor the work was in charge of E. M. Philpot, General Bridge Superintendent, and O. S. Sollars, Superintendent. Thomas C. Collier was Resident Engineer for the Texas State Highway Department.

New Hercules Distributors

The Hercules Co., Marion, Ohio, has announced the appointment of Edward Ehrbar, Inc., 29-33 Messerole St., Brooklyn, N. Y., to serve upper New Jersey, Metropolitan New York and lower New York State, as distributor of Hercules rollers and Ironerolls from its offices in Brooklyn and its branch offices in Newark, N. J., and White Plains, N. Y.

Brooks Equipment & Mfg. Co., 408-10 Davenport Road, Knoxville, Tenn., has been appointed distributor for Hercules in the eastern part of Tennessee.

A.G.C. Convention Biggest, Best Ever

The 21st annual convention of the Associated General Contractors of America which was held in Memphis, Tenn., February 5-8, was one of the largest and best in A.G.C. history, with more than 500 delegates registered.

Highlights of the Convention are summarized by Managing Director Edward J. Harding as follows:

1. Authorization of a national campaign against encroachment of the WPA in the construction field, urging that cost information on construction projects be made public, that WPA officials be prohibited from soliciting construction projects, that the projects be limited to reasonable sums which should be for completed projects, and that sponsors contribute at least 50 per cent of the total cost, of which half would be cash. This resolution also urged the substitution of a program of worth-while public works to be constructed without waste under the contract system, and authorized the appointment of a special committee to develop a national plan to carry out the resolution.

2. A resolution which "endorses a thorough official investigation into conditions affecting all phases of the construction industry, and urges that such steps be taken as may be necessary to correct any practices or conditions within or affecting the construction industry that are contrary to the public interest."

3. Endorsement of the biennial highway authorization bills now before Congress urging that amounts to be authorized equal excise taxes paid by highway users or about $350,000,000 yearly.

4. Full discussion of labor relations problems, along with reports of outstanding progress during the year.

5. Speeches by Assistant Secretary of War Louis Johnson and other Federal officials who stressed cordial relations of their departments with contractors, gave frank advice, and outlined construction programs for the year.

6. Complete staff and committee reports on the past year's activities.

H. B. Zachry of the H. B. Zachry Co., Laredo, Texas, was installed as President to succeed Guy F. Atkinson of San Francisco. M. W. Watson of Topeka, Kans., succeeded Mr. Zachry as Vice President, and E. M. Rust of the Rust Engineering Co., Washington, D. C., was reelected Secretary-Treasurer.

New chairmen and vice chairmen were elected for the building, highway, and heavy and railroad contractors' divisions. They are, respectively, Del E. Webb, Phoenix, Ariz., and Matthew J. Cummings, Boston, Mass., building; F. W. Parrott, Sioux City, Iowa, and Franklyn C. Nelch, Springfield, Ill., highway; and reelected for the heavy division were Oscar B. Coblentz, Baltimore, Md., and H. A. Dick, Portland, Ore.

Elected to the board of directors were Ernest W. Everly, Albuquerque, N. M.; John T. Kelly, Detroit, Mich.; Charles A. Long, Bessemer, Ala.; Edwin L. Jones, Charlotte, N. C.; and C. E. Lott, Pittsburgh, Pa. Reelected were J. L. Hazen, Spokane, Wash.; H. H. Hilp, San Francisco, Calif.; W. S. Bellows, Houston, Texas; Arthur A. Dobson, Lincoln, Nebr.; F. W. Parrott, Sioux City, Iowa; S. M. Siesel, Milwaukee, Wis.; and W. R. Smith, Meriden, Conn.

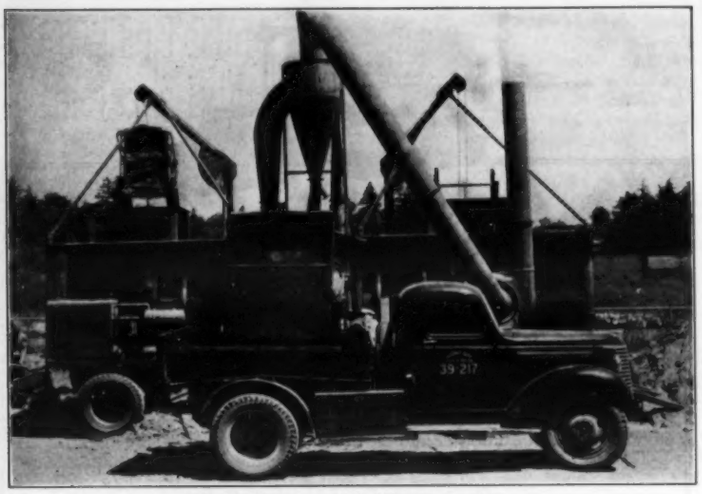
The spring meeting of the governing and advisory boards will be held in Milwaukee, Wis., at a date to be announced later, and the 1941 convention will be held in Houston, Texas.

New Big Tractor Models Have Gas or Diesel Power

At the Road Show in Chicago last month, The Cleveland Tractor Co., Cleveland, Ohio, announced several new models of heavy-duty crawler tractors with either diesel or gasoline engine power. The new Model F has 95 drawbar hp, the Model D, 61 hp and the Model HG, a new small tractor for general utility service, delivers approximately 15 drawbar hp.

Bulletins on these various new units giving all of the specifications and dimensions may be secured direct from The Cleveland Tractor Co.

Want information on equipment? Write the Editor.



The Gerlinger portable bituminous plant.

Portable Paving and Maintenance Plant

The Gerlinger portable paving and maintenance plant, made by the Dallas Machine & Locomotive Works, Dallas, Ore., is designed to provide a truly portable machine which will produce asphaltic concrete or plant mix for small construction jobs, such as building up shoulders, paving driveways, etc., and for patching and resurfacing work. The entire plant is mounted on one trailer, the weight and dimensions of which meet the legal requirements for transporting over public highways. It takes from 1½ to 2 hours to set the plant up for operation and from ¾ to 1 hour to prepare it for transportation.

The plant consists of two drier drums, mounted on ball-bearing trunnions, and a twin shaft ball-bearing-mounted pugmill mixer, with two Ford V-8 power units, a Worthington air compressor, burners, American blowers, pump, skips, and other accessories.

The aggregate is proportioned by weighing in wheelbarrows on a Fairbanks-Morse multiple-beam scale and then dumped into a skip which elevates and dumps it into a hopper above the drying drum. The aggregate is discharged from the hopper into the drier drum where it is dried and heated to the desired temperature, and then discharged from the drum through suitable chutes into the pugmill mixer. The proper amount of asphalt is then added by pumping it through a 2-inch Niagara asphalt flow meter, and the dust which is collected during the drying period is also added to the mix. When the aggregate, dust and asphalt are thoroughly mixed, the batch is discharged from the mixer into a skip which is located directly under the mixer and which then elevates and dumps the finished batch into trucks. The drier drums are charged alternately so that as soon as the batch from one drum is mixed and discharged from the mixer, the batch in the second drum is ready for the mixer which has a capacity of 1,000 pounds. With a one-minute cycle on the mixer, the plant has a capacity of 30 tons an hour.

Complete specifications on the Gerlinger portable asphalt plant may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item, or from this magazine.

New Portable Saw For Pile Cut-Offs

A new gasoline-engine-driven portable timber saw capable of cutting 16, 24 and 36-inch timber and of particular value for cutting off wood piles has been announced by Reed-Prentice Corp., Worcester, Mass. The gasoline-engine-driven unit is designed to meet the requirements of mechanical timber cutting in the woods or wherever power or air lines are not available. The saw is also made with electric and air drive.

The swivelling frame construction of this saw permits setting and locking it in vertical, horizontal or angular positions as required. The swivel joint between the engine and the frame permits dismantling in 15 seconds into two parts convenient for carrying. The frame unit on the 24-inch size weighs but 35 pounds and the engine 45 pounds. The clutch, for stopping the saw chain in moving from cut to cut, is controlled from the right handle, while the gas supply and the starting of the engine is controlled from the left handle. A grease gun is attached to the frame for oiling the chain.

Complete information and illustrations are found in a bulletin which may be secured free on request from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

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Maintenance Budget Should Be Itemized

(Continued from page 4)

gradually, it may be that highway engineers in general, even though they recognize and are organized for each new phase that has been introduced, have failed to realize that others may not also have recognized the increased scope of highway maintenance, with the result that it has not been adequately provided for in the budgets.

Maintenance requirements should be broken down into three definite parts: 1. ordinary maintenance, necessary for routine repairs; 2. operation, needed to control and permit the maximum use of the highways, such as the control of traffic through the installation and maintenance of traffic control signals, warning signs and devices, striping of highways, counting the volume and otherwise determining the use made of highways, snow removal and ice control, and the maintenance and improvement of the roadsides; 3. betterment, such as the installation of additional drainage systems, widening pavements at specific locations, banking of curves, and similar work, all of which are distinct from reconstruction and widening where an entire section of road is improved by reconstruction.

It will greatly aid in securing the necessary funds to carry on the work of maintenance departments if the costs of such work are carefully analyzed and allocated to these various phases of highway maintenance, and so presented in the budgets. Only in this way can those in charge of highway funds be made to realize the wide scope of activities involved in modern highway maintenance.

A New Convertible 1/2-Yard Excavator

One of the many new machines which brought forth great interest on the part of contractors and highway engineers at the Road Show, was the new LS-60 ½-yard shovel-dragline crane exhibited by Link-Belt Speeder Corp., 301 W. Pershing Rd., Chicago, Ill. Among the features which attracted attention were the interchangeability of the drum, swing, retract and boom hoist clutches. The drum shafts, reverse shaft, and main power shaft turn on self-aligning roller bearings. The drums themselves are of large diameter and grooved and are mounted on separate shafts. The LS-60 is equipped with a new safety-type rapid boom-hoist for crane duty, but the conventional worm gear boom-hoist is optional equipment. It has a 56-inch turntable with roller-bearing hook rollers. Double fully enclosed traction brakes, controlled from the cab of the machine, serve both as brakes and traction locks. This excavator has two travel speeds for power and mobility. Buyers have the choice between Link-Belt Speeder lug-driven tracks or genuine Caterpillar tracks. Both are equipped with smooth non-clogging crawlers and recoil springs.

This machine is quickly convertible from one attachment to another without mechanical alteration in the machine itself. Chain crowd is used with the tubular boom and dipper stick. Bulletin LS-60 gives all the dimensions and specifications of the ½-yard Link-Belt Speeder LS-60. Copies may be secured direct from the manufacturer by mentioning this item.

Selecting V-Drive Belts

The problem of how to select a V-drive using stock belts is explained in simple non-technical terms in a new 24-page catalog on fractional-horsepower V-belt design recently issued by the B. F. Goodrich Co., Akron, Ohio.

Pointing out that the problem is simply to select sheaves and a standard belt which will transmit power from a selected motor to a driven unit at required speed, the catalog lists the following information to be known before a drive is selected: type of machine and work to be done; rpm of the driving shaft; rpm of the driven shaft; the nameplate hp of the motor or other prime mover; and the space limitations. Nine separate steps by which the selection of a V-belt drive may be made are then clearly explained, and with each step an example is given. This is followed by a discussion of V-belt practice, and conversion of belt numbers and standard fractional hp V-belt pulley groove top widths are also given.

Copies of this informative booklet, No. 2180, which contains considerable additional data to that mentioned above, may be secured by interested contractors and engineers direct from the B. F. Goodrich Co. by mentioning this item.

Driving Allegheny Tunnel On Pennsylvania Turnpike

(*Continued from page 1*)

service buildings for compressors, shop, etc., the engineers' office building, and a change house for laborers, another for engineers, all equipped with showers and toilets. Because of the location of the east portal on a small stream and the need for sanitary restrictions, a large San-Equip metal septic tank was installed for sanitary sewage.

Driving the East Heading

Work at the east heading started with 337 feet of topheading and bench before the full face was started. The bench was 12 feet high and 32 feet wide and was completed October 6, 1939, when work began on full-face operations. On both the bench and full-face operations a double industrial track with a crossover was used, with the average space between the tracks being about 10 feet center to center.

The jumbo for the four Ingersoll-Rand DA 35 drifters used in topheading was mounted on one of the Koppel cars. For drilling the bench, 9 to 10-foot ring holes were used with 7-foot cut holes spaced three on each side of the center. The ring holes were spaced about 4½ feet on centers, including the bottom lift holes. The number of cut holes was doubled for full-face operations.

The holes were loaded with Atlas 40 per cent gelatin dynamite and fired with a switch from the 440-volt firing line carried alone on the left side of the tunnel, facing the heading. On the right side the light line and the rubberized fabric ventilation tube, as well as the air and water lines for the drills, were carried well away from the firing line. The air line was a 6-inch steel pipe connected with Dresser couplings, while the water line was a 2-inch line with screwed couplings. At the face a 2½-inch white-rubber air hose was used and a 2-inch black-rubber water hose. For lighting the tunnel and the heading, 50-watt bulbs were used, spaced 4 feet apart at the face and 12 feet apart near the portal. A 500-watt pedestal light with floodlight reflector was used to illuminate the face.

For mucking the tophead, a Conway No. 60 electric mucker was used, powered with a Westinghouse motor and operated by one man and a helper. The Koppel muck cars were moved by two Goodman Mfg. Co. electric locomotives equipped with Philco batteries. Two extra battery boxes were kept in readiness, fully charged, for service at all times. The mucking crew, in addition, had two men hand-shoveling to clean up against the face and eight laborers on track, timber and odd jobs.

While working the topheading, an Ingersoll-Rand Tugger hoist was used to move the muck cars. For benching one of the Goodman electric locomotives was used, but when the full-face operations began two of these locomotives were installed. During topheading operations the cars were dumped at the portal and the material rehandled by a Bucyrus-Erie 33-B loading to an Athey crawler wagon hauled by a D8 tractor. The waste dump was an extension of the shelf on which the contractors' and engineers' buildings were erected. A Caterpillar D8 tractor with a LeTourneau bulldozer was used to trim the waste dump.

High and Low Air at East Portal

In order to ventilate the east heading, an Ingersoll-Rand blower with a 100-hp General Electric motor was used to deliver air to the Ventube rubberized duct which was carried to within 100 feet of the heading at all times.

The high-pressure air equipment for operating the drills was located in one of the galvanized iron houses and consisted of two 1,100-cubic foot Ingersoll-Rand Type XRF compressors driven by 200-hp G-E motors. Outside the compressor house two large air receivers in tandem took up the slack in the line. In one section of the compressor house a Hertner battery charger was located to service the battery boxes for the electric locomotives.

Steel at East Heading

The steel for the tunnel lining in the east heading consisted of 8-inch 40-pound H-beam posts with a 2-segment arch. Near the portal they were spaced on 22-inch centers and then successively 4, 5, 6, and finally uniformly on 8-foot centers. As the rock was fairly uniform in the east heading, no particular difficulties were encountered in drilling, mucking or the placing of steel.

C. & E. M. Photo

Method of handling muck from the topheading at the east portal of Allegheny Tunnel.

Large Culvert Below East Portal

In the ravine below the east portal, the contract called for pouring a 323-foot concrete culvert with a 14-foot span and 7 feet 6 inches clear, requiring 2.92 cubic yards of concrete per linear foot for the footing and barrel. This culvert will carry 22,000 cubic yards of fill with a maximum height of 70 feet so that the Turnpike may cross the ravine at a high grade. The character of the rock in the bottom of the ravine was so poor that a 2-foot 6-inch mat was poured for a footing in order to spread the load and also

(*Concluded on next page*)

5,904-Foot Tunnel Built for Turnpike

(*Continued from preceding page*)

to prevent the culvert from floating before the fill was placed.

The aggregate for concreting the culvert was stored near the east portal about 70 feet above the culvert and was batched in General wheelbarrows weighed on Johnson scales and then mixed in a Ransome 14-S side-skip mixer located beside the culvert. Batched aggregates were chuted to the mixer skip down a metal pipe and the cement added in the skip.

Operations at West Portal

The driving of the heading from the west portal was somewhat more difficult than at the east portal because, in spite of running only a 13-foot topheading at the start, clay with sandstone about 7 feet above it was encountered. The wall plates were carried in a drift ahead on each side because of the soft ground, using 12 x 8-inch timber 16 feet long. Temporary timber was placed before the shooting so that the blasted material would not fill the drift. The lagging was not placed solid but left somewhat open so that it would be possible to pack the over-breakage with solid rock ahead of concreting.

Benching at the West Heading

The four I-R DH35 drifters were mounted on a jumbo carried on a Koppel flat car with all of the connections inside the car for protection. Air for the drills was brought into the tunnel in a 4-inch steel air line with Dresser couplings and water to the bench was carried in a 2-inch water line reduced to a 1-inch water hose of black rubber, while the 3-inch air hose to the jumbo was of white rubber. The drill crew consisted of one man and a helper for each of the four drills, two timber men, two miners, two chuck tenders, and two helpers on the bench. As soon as the first 250 feet of topheading had been completed, two Ingersoll-Rand M2 wagon drills were installed, fitted to columns and bars, to begin to remove the bench so that the tunnel could be driven as a full-face operation. In the removal of the bench, because of the poor character of the rock, the center of the bench was half-mooned and then mining was continued by hand at the sides, cantilevering timbers to support the arch ribs while the material was removed below, preparatory to installing the full-height posts.

Practically every round of drilling was different from the succeeding round because of the rapid change in character of the rock in the west heading, but in general the ring holes were drilled 3 feet from the top and on 4-foot centers and only 4 feet deep. After packing, great care was taken in barring down old loose material. Detachable Jackbits on Ingersoll-Rand drill steel were used throughout the drilling in this heading. The bits were equipped with side-hole openings, as the center holes plugged too quickly in the soapstone and other soft material. New York water heads were used on the drifters so that the driller would not have to turn on the water when he started drilling; instead it opened automatically whenever he started the air.

In the softer ground, the holes were loaded with Atlas 40 per cent dynamite, using two sticks and a primer in the cuts and the primer alone for the 4-foot ring holes. The firing line for this heading was carried in on the right with no other utilities on the same side. In the heading a safety switch was installed that grounded the line, then there was also a break in the line and the shooting switch outside was locked to prevent any possibility of premature blasts. Shooting was done in parallel off the bus wire of the 4,400-volt pole line. The ventilating equipment for the west heading was the same as for the east.

Mucking the West Heading

Two sets of track were laid on the topheading approximately 10 feet apart center to center, using 6-foot sections for easy handling at the face. As soon as there was room for five of these sections, the shorter lengths were removed and a 30-foot rail installed. During the removal of the topheading the 6-yard Koppel muck cars were handled by an Ingersoll-Rand Tugger hoist and electric-battery motor and then, when full-face operation was started, two Goodman electric locomotives were installed to handle the muck cars and the jumbo. Working from the topheading, the muck cars were dumped at the portal and the material re-loaded by a Bucyrus-Erie 33-B to a 13-yard Athey crawler wagon hauled by a Caterpillar D5 tractor and moved 1,500 feet to the spoil pile or to embankment.

Air for the drilling operations was furnished by a complete Ingersoll-Rand outfit identical with that at the east portal and the galvanized iron building also housed a duplicate Hertner electric battery-charging outfit. Located close to the track for removing the muck was a Crescent Machine Co. circular saw used for cutting the posts and spacers for the tunnel lining and steel respectively. The tunnel was lighted with 50-watt bulbs spaced every 25 feet uniformly and a 1,000-watt pedestal floodlight at the face.

Timbering and Steel at West Heading

The steel ribs in the west heading consisted of 8-inch 40-pound H-beams spaced 4 feet on centers, but as close as 18 inches on centers at the portal. They were tied with ¾-inch rods and spaced with 5-inch hard oak spacers. The crown bolts were all 1¼-inch diameter steel. All of the brackets on the H-beams for connecting the posts with the arch segments were welded with a Lincoln Stable Arc machine.

Personnel

For Guthrie-Marsch-Peterson Co. of Chicago, Ill., contractor for both portals of the Allegheny Tunnel, H. J. King was General Superintendent with H. J. "Pat" McCune as Assistant Superintendent at the east portal and R. B. Wickiser, Assistant Superintendent at the west portal. For the Pennsylvania Turnpike Commission, E. A. May was Chief Resident Engineer with offices at the west portal and Thomas A. Frazier, Assistant Resident Engineer, at the east portal.

New Diesel Engine Booklet

An attractive and well-illustrated "question and answer" booklet on high-speed heavy-duty engines has just been issued by the Hercules Motors Corp., Canton, Ohio. Featured by the use of the question and answer form, this book presents some interesting comparisons between diesel and gasoline engines, and between the two-cycle and four-cycle types of diesels. Many of the questions you would like to ask are asked and answered in this 20-page booklet, which also includes complete information on the Hercules line of 2, 4 and 6-cylinder diesel engines.

Copies of this booklet may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item, or from this magazine.

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The ready-mixed concrete outfit of the Transit Mixed Concrete Co., formerly a road contracting firm, at Owensboro, Ky.

Ready-Mixed Concrete In the Smaller Cities

Contractors and Others Create New Volume of Business With Moderate Investment

✦ SEVERAL ready-mixed concrete enterprises were initiated during the past year in comparatively small cities where there were no previous local ready-mixed services. Originally, the ready-mixed concrete industry was associated with the larger centers of population as it has been thought that the potential business of a large city is necessary to justify the investment in equipment for ready-mixed operation, and the possibilities of the smaller cities have been overlooked. They may provide a fertile field for those already engaged in the building supply business, for sand and gravel companies, and for contractors who also have an opportunity to use the truck mixers on their own contracts. Among the smaller cities where interesting installations have been made recently are Ashland, Ky.; Owensboro, Ky.; and Roanoke, Va.

New Plant at Ashland, Ky.

The Wheeler & Putnam Co. of Ashland, Ky., has been operating a building supply business for many years. Aggregates are delivered to its yard by barge, and the material is then unloaded by a conveyor system into bulk bins located at the south end of the yard. The Blaw-Knox loading plant was installed near a railroad siding. Bag cement is transported by means of an inclined belt conveyor from cars to an elevated cement house, the floor of which is on the same level as the operating platform of the charging plant, and cement is emptied into a hopper depressed in the floor of the cement house. This hopper, which discharges into the mixer, holds a sufficient number of sacks of cement for one batch.

As additional aggregates are required at the ready-mix plant, they are taken from the bulk storage bins in trucks and delivered to pits located near the mixer loading plant. The material is then picked up by a crane with clamshell bucket and transferred into the overhead bin of the charging plant. Wheeler & Putnam has three Blaw-Knox 1½-cubic yard Trukmixers, all mounted on Reo chassis.

Ashland is a city of about 29,000 population. In addition to this market, the adjacent towns of Catlettsburg, Ky., and Ironton, across the river in Ohio, with another 22,000 people, and several smaller communities, can be served economically with ready-mixed concrete from the Ashland plant.

Roanoke, Va., Plant

All aggregates are delivered to the site of the loading plant of the Roanoke Ready-Mixed Concrete Corp. of Roanoke, Va., by rail, and unloaded from cars to bin or ground storage by crane and clamshell bucket. The overhead storage bin has a capacity of 110 tons, divided into three equal compartments. The Blaw-Knox weighing batcher for the aggregates is of the 1½-cubic yard size for three materials. It is the round-nose type which permits the aggregates to be charged directly into the truck mixers without the use of a funnel or a confining hopper. This plant is equipped to deliver heated concrete. A 500-gallon water tank is heated by coils from a 30-hp boiler. Steam lines have also been run to each of the bin compartments to overcome freezing of moisture in the aggregates.

The Roanoke Company operates a total of six Trukmixers, four of which are mounted on International trucks and two on Dodge trucks. Cement and water are loaded into the mixers at a cement house.

And At Owensboro, Ky.

The third member of the trio is the Transit Mixed Concrete Co., formerly a road contractor, of Owensboro, Ky., the population of which is 25,000. The plant of this company has features in common with both the Roanoke and Ashland installations. Aggregates are delivered to the boot of the vertical bucket elevator from a nearby sand and gravel yard by truck and raised to the overhead three-compartment 110-ton bin. Cement is delivered in bags on a siding located adjacent to the charging plant, and the bags are placed in storage in an elevated cement shed by means of a Barber-Greene inclined belt conveyor. The truck-mixers drive beneath the aggregate bin to get their first charge and then beneath the cement house where they receive the charge of cement from a hopper in the floor of the house.

The Transit-Mixed Concrete Co. operates two Blaw-Knox 1½-cubic yard Trukmixers, both of which are mounted on cab-over-engine type GMC trucks.

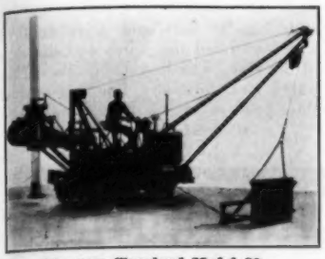
New Wheel Tractor Has Hesselman Motor

The new Case industrial tractor, Model LIH, exhibited at the Road Show, is powered with a Case engine in which the fuel is injected and then ignited by a spark in accordance with the Hesselman system. The J. I. Case Co., Racine, Wis., states that this gives lower initial cost than a straight diesel-type tractor of the same power and capacity with lower maintenance cost, longer life, easier starting in any temperature and a smoother engine performance on a wide range of fuels.

This new Case tractor is equipped with electric lights and starter as well as 7.00 x 20 front and 15 x 28 rear tires. A lubricating oil filter is located on the right-hand side of the motor. The fuel injection system is so constructed that the time at which the injection ends is always the same regardless of the time when the injection begins. If the load gets heavier, requiring more fuel in the chamber, injection starts sooner but always stops at a fixed time before the fuel is completely compressed and ignited. Therefore, all fuel that is to be used is in the chamber at the time of firing, giving assurance of a saving in fuel and complete efficient use of the fuel with a reduction of oil dilution and the elimination of black smoke and backfiring.

All controls and gages are conveniently located at the operator's fingertips. Heavy steel roller chains and sprockets in the final drive distribute the load over 60 teeth instead of the usual 4 to 8, reducing friction and producing more and smoother power at the drawbar. The drawbar is vertically adjustable, making this 56-hp tractor available for a wide variety of services in the construction and in the high fields.

A complete description will be found in Form A-11040-A.



The new Cleveland Model 80.

Backfiller-Tamper Shown at Road Show

A machine, announced as the only one of its kind, which backfills and tamps trenches and can also swing pipe into trenches, drew crowds to the Cleveland Trencher Co.'s booth at the Road Show. The Model 80 works from either side of the ditch, either pulling the dirt in or pushing it in with the scraper. There are two scrapers with the machine, one a light weight unit which permits backfilling without damaging the lawn where dirt has been placed on sidewalks or lawns, and a heavier scraper for the big jobs.

It is also equipped with a built-in tamping device which drops a weight of 175 pounds forty-five times per minute with a resulting impact of 380 foot-pounds. Because of the way the tamper is geared the blows overlap considerably and the force of the blows and their regularity are held uniform. The manufacturer states that the machine has demonstrated repeatedly that it can replace as much or more dirt in the trench as was originally taken out. Because of the greater force obtained with this machine the usual layers tamped by hand can be increased three to four times in thickness and still the tamping is done at 40 per cent less cost than by other methods. By combining the backfill scraper and the tamping, the speed of covering up a trench is increased greatly.

The boom and cable winches of the Model 80 have been made strong enough to permit the handling and laying of pipe, pulling of sheeting and other light crane operations. With the load 9 feet from the edge of the crawler the crane can handle 1,600 pounds or, at 3 feet, it can handle a load of 5,000 pounds. The Model 80 without the scraper weighs 8,600 pounds, has an overall width of 5 feet 4 inches and is powered with a Hercules or Buda 4-cylinder engine, equipped with a self-starter. It operates at speeds from 2.5 to 22.5 feet per minute and road speeds up to 2⅛ miles per hour.

Complete information may be secured from the Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland, Ohio.

Oil and Fluid Seals for Construction Equipment

The sealing of lubricants in bearings as well as the sealing of the oil in hydraulic control systems is an important contribution to the efficiency of modern construction equipment. Oil and fluid seals must be carefully designed for the work they are installed to do. National Motor Bearing Co., 1100 78th Ave., Oakland, Calif., has developed a series of oil and fluid seals which they refer to as of engineered design which are particularly effective in performing their functions.

These seals are described and illustrated in detail with a complete size and price list in Catalog No. 44 which will be supplied promptly to readers of CONTRACTORS AND ENGINEERS MONTHLY by applying direct to the manufacturer.

Accurate Road Mix With a Travel Plant

In order to introduce greater accuracy and inject high quality into low-cost roads with complete control at every step, Barber-Greene Co., Aurora, Ill., developed the Barber-Greene Mixer as the basic unit for a stationary central plant or a travel plant. When combined with a B-G bucket loader, the basic unit forms a Travel Plant. This plant moves down the road and the bucket loader picks up and feeds the aggregate into the mixer hopper. The aggregate is measured out through the apron feeder at the bottom of the hopper, sprayed with metered bitumen, and discharged into a twin pug mill. The pug mill mixes the material and discharges it into a mixed windrow on the road at the rear of the machine, or into a finisher which spreads the material uniformly. With this type of machine the work is done continuously down the windrow with no batches and no corridors.

The new B-G traveling road-mix plant.

Barber-Greene Catalog 848 describes very thoroughly all of the features of B-G bituminous mixers with numerous excellent illustrations and diagrams showing how these plants are used as central set-ups under different ground conditions as well as for traveling plant operations for bituminous stabilization. Copies of this catalog and information on the newest and smallest of the B-G mixers will be sent free on request.

C. & E. M. Photo
Hustling bulk cement from cars to the batch trucks on J. R. Griffith Co.'s 7.03-mile concrete paving job between Janesville and Edgerton, Wis.

Well-Balanced Crew For Concrete Paving

(Continued from page 11)

than the distance between two box-car doors. Two men loaded from one car, with one of them wheeling, and in the second car two men loaded and a third wheeled. Each buggy of cement was weighed on a Gaston scales and then spotted over one of the two dumping holes above the trucks which backed down a depressed roadway. Each dumping hole was surrounded by a curtain of inner tube material hung from the edge to prevent the splashing of the bulk cement as it was tipped from the buggies onto the batches. One man on the dock attended to all the weighing and making up of the weights to the proper figure. As the trucks drove away from the dock a man on a platform stepped onto the batch truck and covered the cement with the sand of the batch to prevent loss from the wind.

Joints and Reinforcement

The expansion joints were spaced 100 feet apart on this contract with the contraction joints at 25-foot intervals. Three men working ahead of the form-setting crew along the shoulders assembled the expansion and contraction joint dowels and steel. All the assembled expansion joints, contraction joint steel and the welded fabric mats for the slab were laid out on the left shoulder as the work progressed, ready for the steel men in the crew to move into place.

The expansion joints consist of ¾-inch Servicized premoulded impregnated material with 16 round ¾-inch painted and oiled dowels 24 inches long across the two 10-foot pieces of the premoulded material which were assembled in a special joint setting device. The dowels were held in position by a 9-foot 6-inch long ½-inch deformed tie bar to which the dowels were all cross-tied. The dowels were all capped with a metal cap on one end. The premoulded material was encased in a pair of sheet metal plates which key it to the adjacent slabs and also provide space for the material to enter instead of extruding from the joint in hot weather. These plates are 4 inches high and were set at the bottom of the material topped by the 2¼-inch setting cap which was removed by the joint finishers.

When setting an expansion joint, the setting device was so arranged that a separate arm was hooked over each end of each dowel to hold them in exactly the correct elevation in the concrete. As the joints were assembled upside down, it was necessary first to invert them and then place on the subgrade. In preparation for this, a pair of boards were set on the subgrade and the base concrete struck off over them, then the concrete shoveled off and the boards removed. This left a clean space for the joint which was set on this job without any pins as the setting device held the material rigidly and the puddlers were particularly careful in placing the concrete around on both sides of the joint before the paver bucket dropped any concrete in that vicinity or before the finishing machine approached close. The steel fabric was placed close to the expansion joint on each side.

Each contraction joint was reinforced with a "ladder" composed of the same dowels and tie bars as the expansion joint, painted and oiled but without the caps. The fabric reinforcement was similarly placed over the ends of the dowels of the contraction ladder. The concrete was vibrated along each side of each expansion joint and through the center of the contraction joint reinforcement. The location of each expansion joint in the pavement was marked by a dowel set in the shoulder close to the forms and the contraction joints by crayon marks on the forms.

The welded fabric reinforcement consisted of No. 4 wires spaced 6 inches both ways and with the mats 12 feet 6 inches long and 6 feet 6 inches wide so that three of the mats laid longitudinally across the slab lapped 6 inches at the middle mat. These were laid on the concrete as struck off by the paver strike-off 2 inches below the top of the forms by two men who picked up the first two mats on the shoulder and walked in on the concrete, placed the mats and then went out onto the shoulder and picked up the third mat, walked across the other two and placed that.

Laying Down the Concrete

The big paver was equipped with a pair of heavy weights swung by chains in the skip so that every time the skip hit the top of its lift the weights gave a couple of thumps to the skip and loosened any cement which might be stuck. That relieved the dump man of an extra duty and left him free to do the same thing for the batch trucks as the batches were dumped.

The mix in the 34-E paver was so effective that the design water for the mix was reduced and still left the concrete workable and caused no trouble for the finishers. The mixing time was 74 seconds for the two batches mixed at a time. The paver pulled a trail-grader and a strike-off for the concrete. This was pulled at a set distance from the paver by three cables, and was composed of an old steel checking template well loaded with sand bags at the end. Two men at each side of the trail-grader shoveled the excess earth gathered by the blade and also cleaned against the forms where the dirt spilled around the end of the blade.

Four puddlers in the concrete kept it moving to the right places and one man with a Roeth mechanical vibrator on each side mounted on a pipe frame and with handle bars and a rubber-tired wheel vibrated the joints and the sides of the slab. The hose connection at the paver and the water line consisted of Boss quick-acting unions.

(Concluded on next page)

C. & E. M. Photo
One of the two Rooth vibrators used along the forms and at all contraction and expansion joints.

Attention to Details Speeds Wisconsin Job

(Continued from preceding page)

Machine and Hand Finishing

A double-screed Jaeger-Lakewood finishing machine followed closely behind the puddlers and the operator shoveled any excess concrete away from the ends of the front strike-off. Right behind the finishing machine was the Cleft Plane machine which was self-operated and cut the slot for the 2¼-inch ribbon and placed it. The machine carried the contraction-joint cutter at the back. The operator guided the ribbon into the slot and the helper floated over the groove. At the contraction joints the ribbon was cut, leaving a gap of 2 inches, and the 2½-inch joint bar inserted in the contraction-joint slot. The two bars, each 10 feet long and ¼-inch thick, were keyed together at the center to give a uniform slot across the pavement to be poured later.

Immediately behind the Cleft Plane machine was the Koehring Longitudinal-Finisher with a 12-foot float working across the pavement and advancing 6½ feet on each pass across. Behind this machine came the first pair of hand finishers. They used a wooden drag straight-edge 10 feet long to scrape off laitance and then belted the pavement with a 6-inch canvas belt sawed across the pavement as it was worked forward. The next finishers lifted the joint iron and edged the sides and belted the pavement again. The final pair of finishers were employed with the edging of the joints. Where the grade of the slab was low behind the longitudinal finisher, extra concrete was brought back, the surface reworked and checked with a 10-foot long-handled straight-edge. This was only where the concrete had been struck off low in isolated places

Curing with Paper

As soon as the surface of the concrete had set, it was sprinkled lightly and immediately covered with Sisalkraft paper rolled in 20-foot widths and 65-foot lengths on 2 x 4-inch poles. These covered the slab and then the edges or sides of the slab were covered as soon as the forms were removed by using a long roll of the paper 2 feet wide. The paper was held close to the slab at the edges by a line of earth carefully shoveled onto it so that the wind would not balloon the paper and blow it away. Two men handled the covering of the slab with the paper and then two others removed it and sent it forward 3 days later.

Water Supply

Because of the length of the project and the number of peaks in the grade, Griffith provided two pumps. A C. H. & E. triplex pumped into the 2½ and 2-inch line from a stock trough fed by water from the County Farm supply at the south end. At the north end a Rex pump was set up on the bank of the Rock River. During most of the time both pumps were used as either one alone was not sufficient to give the required pressure at the paver and also supply the water for sprinkling the grade and for the curing. The paver hose valves were placed at 200-foot intervals and the paver carried 150 feet of heavy paver hose. A total of six pressure domes were inserted on the line on the theory that they would trap air and act to reduce water hammer on the line due to the quick shut-off of the paver water-measuring device. They did not prove of any particular value and most of them were discarded early in the work. A relief valve at the end of the line was of much greater value except that the pressure was such that it operated most of the time, providing an Old Faithful on the shoulder.

Major Quantities

The major quantities in the contract for the construction of FAP 450-B on U. S. 51 were:

Common excavation	9,362	cubic yards
Fine grade	1,921	cubic yards
Shoulder embankment	14,600	cubic yards
Concrete pavement	90,548	square yards
Concrete pavement, reinforcing	62,550	square yards
High-early-strength pavement	669	square yards
Gravel surface for 10-foot shoulders	11,410	cubic yards
Corrugated iron culvert, 12-inch	168	feet
Sodding	2,905	square yards

Greasing and Gassing Equipment

A single grease truck equipped with drums of the proper grease for each piece of equipment and with pressure guns greased the paver and other equipment out on the job once a day, the work being done by the greaser and a helper. The fleet of twelve International trucks was greased in the yard at night and the oil changed as required.

The company to which the contract for supplying the gasoline for the machines was given sent out a truck onto the job and fueled the heavy equipment there. The trucks filled up their tanks at the company pump in the contractor's yard. The tank truck driver turned in a card each day with a record of the gasoline delivered to each piece of equipment, thus simplifying the records to be kept in the field.

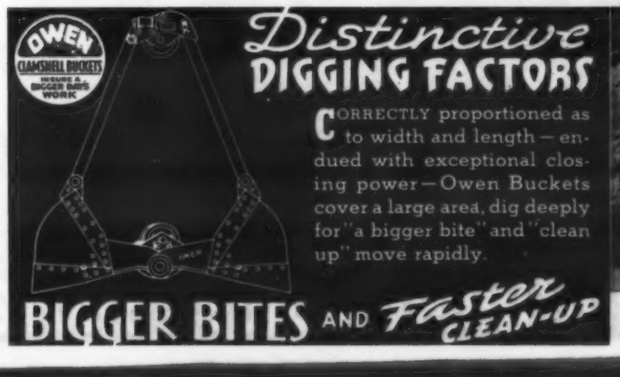
Personnel

The contract for the construction of the 7.63 miles of concrete pavement described in this article was awarded to the J. R. Griffith Co. of Racine, Wis., on its low bid of $149,270.03. J. R. Griffith, a well-known figure in contracting circles in Wisconsin and particularly for his action in the early days of the depression, when the jobs were few and still long, in turning over a portion of his long contracts to other outfits to keep them running, was his own Superintendent on this job. With him were his two sons, Frank acting as Assistant Superintendent, and Richard as Grade Superintendent. For the Wisconsin Highway Commission, E. L. Roettiger, State Highway Engineer, R. R. Swann was Resident Engineer on the paving.

Blade and V-Type Plows For Fast Snow Removal

Snow plows for tractor mounting in V-type, reversible blade type, and one-way types are made by Balderson Mfg. Co., Wamego, Kansas, and described and illustrated in considerable detail in a 16-page bulletin entitled "Snow Moving." Balderson's V-type plows for trucks are made in three sizes for use on trucks from 1½ to 7½-ton capacity. Blackhawk Power-Packer hydraulic equipment is used to lift the plow easily and is installed on the plow so there is no frame to mount on the front of the truck. Standard punched ½ x 6-inch curved grader blades are used for cutting edges. One-way type truck plows are also made in three sizes all to the same general plan and for the same size of trucks.

V-type plows for tractor mounting are sturdily built to open 6-foot drifts to a full width of 14 feet the first time through. The reversible blade plows for tractor mounting deliver the snow in either direction, and are especially suitable for mountain roads. The notable feature of this plow is that the blade may be set at right angles with the tractor and used as a bulldozer either in snow or earth moving. Full information on Balderson snow plows may be secured from the manufacturer direct, by mentioning this magazine.



Highway Organization In Marshall County

(*Continued from page* 1)

in each application. The whole width of the material is then bladed and turned some ten or more times with one of the motor graders until fully mixed. The material is then spread to the 12-foot width again and given the second shot and the mixing repeated. After the second mixing is complete, the material is windrowed to the side and the base shot with 0.6 gallon of MC-1 per square yard to waterproof the base before the mat is spread to the full 18 feet of the road surface and allowed to be compacted by traffic. This treatment gives a mat 1½ to 2 inches thick, adequate for the traffic using these roads. The second year after construction these surfaces are sealed with a heavy paving asphalt applied at 280 degrees F. at 0.3 gallon per square yard.

There is a very small amount of county highway in Indiana with adequate right-of-way so the state has made the offer to counties that if the local organizations will secure by purchase or gift a 60-foot right-of-way the state will take over the road and hard surface it and then turn it back to the county for maintenance. These roads are known as the Feeder Road System in Indiana. Marshall County has 20 miles of such road within its area of 440 square miles.

County Highway Organization

Marshall County is divided into three commissioner districts, each of which elects one man to the Board of County Commissioners for a 3-year term every two years. These commissioners act only in an advisory capacity, deciding on questions of policy but leaving the work of county highway construction and maintenance entirely to the county road supervisor whom they appoint for a term of one year. Andy Carothers, the present Supervisor, has held the office for four years and prior to that was Assistant Supervisor for 10 years.

The organization of the maintenance forces of the county is based on the patrol system with a patrol man in each of the ten townships of the county. All but two of these men have trucks which are garaged or stored in their own barns. Other equipment such as mowers is sent out from the central garage as required in each patrol maintenance section.

Financing County Roads

The money for the work on county roads in Marshall County is derived entirely from state gas tax money returned by the state to the county. In 1938 this amounted to $111,181.16. The distribution of the money returned to the counties is based on population and motor vehicle registration.

In addition to the county highway system which must be improved and maintained with this money, there is a total of 32,000 feet of county drainage ditch, one half of which must be cleaned each year out of these funds.

County Highway Equipment

Marshall County has a well-maintained fleet of highway equipment with which to attack the many varied problems of highway work. While a considerably larger fleet of motor graders would be welcomed, it is true that unusually effective use is made of those now owned by the department. There are three motor graders in the fleet, an Adams, an Austin-Western and an Allis-Chalmers. A Caterpillar Sixty gas tractor is used to pull a 12-foot blade Adams leaning-wheel grader and also for handling the two Baker-Maney wheeled scrapers which are used for a great many purposes in the county work. There are four power mowers for the ever-present work of cutting the grass and weeds on the shoulders, these consisting of an International and three John Deere mowers. The truck fleet comprises five Indiana 3½-4-ton trucks, five Diamond T 3½-5-ton trucks, five Chevrolet dump trucks, and a Ford rack truck. There are two 2-bag concrete mixers, one a Jaeger and the other "just came into existence" by home assembly of parts. There are three 3-way drags for gravel road maintenance.

County Garage and Machine Shop

The county has but one main garage for the necessary machine work on the equipment. This is located just one mile east of the center of Plymouth, the county seat, and close to the geographical center of the county. It is a brick structure with an arched wood roof giving a clear floor and measures 100 x 44 feet. It contains the County Road Supervisor's office in one corner with the locked room for the storage of small parts immediately adjacent. All windows are equipped with steel sash and the two doorways have overhead garage doors, one with a slightly higher clearance than the other and both 14 feet wide. These are located one at the end and one in the center of the front of the garage.

The newest piece of maintenance equipment in the garage is a Hall valve resurfacer which is mounted in the store room. Outside the store room is a complete storage and dispensing system for Linco lubricants and there are two greasing trucks consisting of two wheels and two casters supporting a platform which can thus be easily moved from one piece of equipment to another. There is a complete acetylene welding outfit on a 2-wheel truck for easy portability, a hand floor crane, an overhead 1½-ton chain hoist for handling heavy pieces of equipment, a 20-ton gear press, a grinder for sharpening saws and mower blades, a forge and anvil, and a drill press, a power hack saw and another grinder all run from a jack shaft driven by a small electric motor. Another small but handy piece of equipment is a hand-operated device for repairing tire chains.

The gas pump for fueling the trucks and other equipment is located just inside the front overhead garage door where it is protected from weather. The trucks are gassed each night as they come in from work so that there will be no delay in getting out in the morning. There is another factor entering into this, namely, with the garage doors arranged as they are the equipment runs in and naturally fans out from the door. If the machines are gassed as they enter they are all ready to make their exit in the inverse order of their arrival. If the front of the garage were given over to doors across the entire front, or most of the way, the equipment could enter each in a designated location for storage and thus each piece could leave as desired without waiting for the way to be cleared.

Snow Removal

Marshall County follows the policy of going out after the snow on the roads just as soon as a storm starts, in spite of the fact that with the storms in this belt of heavy snowfall there are always high winds accompanying the snow and therefore there is considerable blowing of snow back into the plowed sections. The average snows are from 18 to 24 inches deep with the drifts running up to 11 feet in the cuts. The county owns five V-type snow plows for the trucks and one larger V plow with wings for the tractor. No snow fence is used by the county to reduce drifting onto the roads.

Trucks at Shasta Use Butane Fuel

Pacific Constructors, Inc., Uses This Modern Motor Fuel In 47 of Its Giant Fleet On Shasta Dam Project

(*Photo on page 48*)

♦ BUTANE as a motor fuel is doing the bulk of the work at Shasta Dam, the big feature of the Central Valley Project in California. Pacific Constructors, Inc., the 12-company contracting firm doing the construction work for the Bureau of Reclamation, operates a fleet of 65 trucks, 47 of the largest of which are butane-powered. The 18 big Whites ordered new for the job came fitted for butane operation. These trucks, by the way, are the largest type of dump truck built, having a capacity of 25 cubic yards and a weight, empty, of 20 tons each, and powered by a 40-hp motor with five speeds forward and one in reverse. The remaining butane-powered trucks, 11 7-yard AP Macks, 6 3-yard Fords, and 12 Ford 1½-ton flat racks, were refitted to burn this type of fuel. The other trucks in the fleet, consisting of two Ford 1½-ton flat racks, 14 Ford 1½-ton pick-ups and two 5-ton International flat racks, burn gasoline.

While not new, butane as a fuel is at least among the most modern of motor fuels. It was used with success by the Griffith Co. on Cajalco Dam near Los Angeles, and on the Imperial Dam by the George W. Condon Co.

There were a half dozen factors which entered into the contractor's decision to use this form of fuel. First, there is no crankcase dilution of lubricating oil. The fuel being highly volatile, no liquid forms to run down the cylinder walls. As it comes from the vaporizer, it is a dry gas. Second, it gives a more powerful explosion. Third, there is practically no carbon formation. Fourth, it is slightly cheaper as a fuel at the present price basis, because a little less in gallonage is required as compared with gasoline. Fifth, there is no loss in dispensation, due to improper use or for unauthorized purposes. Sixth, the pressure created simplifies delivery to the carburetor, there being no fuel pump or other mechanical device necessary to get the proper flow.

A Bucyrus-Erie 120-B 4½-yard electric shovel loading one of the mammoth White 25-yard butane-powered trucks at Shasta Dam.

The fuel is delivered in liquid form by the Associated Oil Co., under pressure, in its service truck. From this it is pumped directly to the contractor's truck tanks. The pressure in summer does not exceed 125 pounds per square inch, 80 to 90 pounds being about normal. Using such pressures, it is necessary, of course, to guard against leaks, which might prove a fire hazard. This is covered by carefully written instructions issued by the safety department. On the whole, with reasonable precautions, it is not considered an especially hazardous fuel to use, and it has marked advantages as explained.

The butane tank on the truck is never completely filled. Ten per cent of the space is left for evaporation, which creates a pressure up to 80 pounds per square inch normally, varying with outside temperatures. There is a safety plug, which will blow at 200 pounds, to guard against abnormal pressures.

The pressure created eliminates all mechanical feed devices, and the regulating valve steps the pressure down to 10 pounds. From this valve, the fuel, still a liquid, passes through a vaporizer, which is a coil within a tank filled with water from the motor and operated at motor temperatures. This transforms the liquid into a dry butane gas, which passes through a fuel regulator and to the carburetor.

Truck Repair Shop

All trucks are repaired and maintained in a truck shop 60 x 125 feet which is especially well planned and provided with a thick concrete floor throughout. A 7-ton McClintic-Marshall electric crane serves the side where the heavy trucks draw in for service. The other part of the shop, reserved for lighter repairs, is served by a chain block.

It is in the service pits that the greatest ingenuity has been displayed. There is a long sunken gallery running lengthwise of the building, and half a dozen pits over which the trucks stand are taken off from the gallery at right angles. On one side of the gallery is a steel table equipped with vises and the ordinary tools required for underneath work. The truck drives straight in from the side entrance over a pit, and the mechanic working underneath finds everything he needs in the gallery, without having to clamber in and out of the pit. If there is occasion for him to come up, there is a permanent ladder at each truck pit so that he does not have to traverse the length of the gallery.

Want information? Write the Editor.

Mobile Wagon Drill For General Road Work

To better fill the demand for a lightweight mobile all-purpose drill for road work, ditches, roadside quarry work and similar applications, Worthington Pump & Machinery Corp., Harrison, N. J., has brought out the Model UPW Rock Master wagon drill, with a No. 280 drifter. A worm and gear device makes it easy for a man to position the U-arm, while the drifter control, feeding, drilling and blowing are centralized. The drifter includes pneumatic feed and independent rotation which facilitate operation in shattered ground or through overburden. The mounting features pneumatic-tired rear wheels easily swung 90 degrees by loosening a large wing nut, a large third wheel, four peg legs for bracing the rig in unusual drilling positions, an unattached line oiler and a tow bar with both T-handle and towing eye.

Full data may be secured from Worthington by mentioning this item.

Highways of 1960— What Will They Be?

(*Continued from page* 16)

in tomorrow's car. You will drive at forty or fifty or thirty or sixty, according to the button you push. The cars behind and in front of you are kept at the same constant speed. There can be no overtaking, no collisions."

These statements are visionary, agreed,—so was the submarine of Jules Verne. Let us too, think, plan and execute our road designs in terms of twenty years ahead instead of merely five or ten years. It is well known that the traffic studies of one of our great public utilities, the American Telephone & Telegraph Co., have been carried on for several decades in cities large and small to determine the direction of future growth of cities. These surveys by trained men have resulted in the installation of telephone cables, the roads of the voice, well in advance of their needs. Our present state highway planning surveys must be used in a similar manner to enable us to secure the maximum rights-of-way now for our highways of two or three decades hence.

Those who were privilged to view the General Motors Futurama will remember the voice talking directly to you as you traveled above the World of Tomorrow, saying: "This superb one-direction highway, with its seven lanes accommodating traffic at designated speeds of 50, 75 and 100 miles an hour, is engineered for easy grades and for curves that require no reduction in speed. Cars from the farm roads and feeder lanes join the motorway traffic at the same speed as the cars traveling in the lane they enter. To insure safety, the various lanes are safeguarded by border separators and grass stripping."

A few moments later as we approached an intersection, the voice remarked: "Here is the crossing point of two double-directional motorway routes. Here is highway engineering at its most spectacular. Traffic may move safely and easily without loss of speed. By means of the ramped loops, cars may make right and left turns at rates of speed up to 50 miles per hour. The turning-off lanes are elevated and depressed. There is no interference from the straight-ahead traffic in the higher speed lanes. The motorist of 1960 finds this intersection safe and efficient. Actually, in proportion to the motorway's traffic volume, this intersection occupies no greater area than the clover-leaf of 1939."

And then at the end of 13 minutes of comfortable yet breath-taking travel in the future, you stepped from the chair into the midst of a busy city street intersection of 1960, safe above motor traffic, with the department store, cinema palace and apartment-house entrances one story above the street, leaving the pedestrians safe to cross at will above traffic.

Another example of what we may expect in future highway construction—the elevated highway in cities—was shown strikingly in the Ford Motor Co. Exhibit where multi-colored automobiles gave the visitor a ride of nearly a mile above the throngs of sightseers, on a highway which may well be an example of artistic and practical design for elevated motorways in cities of the future.

New York's World's Fair of 1940 opens on May 11, and it is hoped that thousands more state and county highway engineers and officials, as well as all planners for the future, will visit these two outstanding educational exhibits of highways of tomorrow, as well as the hundreds of other exhibits of North and South America and the lands across the seas in which facts and the works of commerce, science, industry and art will be poured out as from a horn of plenty for the education and delight of the observant visitor.

Asphalt Application Made More Accurate

The features of the latest of the line of Kinney distributors, the Model A, include an air-operated valve, which gives quick starting and stopping of flow at the spray bars. There are two of these valves, located either in the cab or on the rear platform, or both, which operate two standard Westinghouse air-brake type controllers. When one is operated, it instantly closes the circulating line and starts spraying. When turned back, it gives a clean stop in the automatically air-cleaned spray line.

A Ford V-8 60-hp engine with two forward speeds drives the pump and maintains the speeds required for various application requirements. A low power ratio gives a surplus of power for loading viscous, or sticky, quick-breaking emulsions. A reverse gear allows the operator to pump most of the load back through the loading hose into the bottom of the tank car to break up cold slugs. The suction is taken through the circulation line.

The dead weight of the Model A Kinney distributor has been substantially reduced by using a 72,000-pound tensile strength steel instead of the usual 55,000-pound for the tank. This has resulted in a reduction of 500 pounds on a 1,000-gallon Model A long tank.

The items enumerated above refer to new features in the Kinney distributors, which also retain the Kinney jacketed pump, the heating system with tubes low in the tank to permit safe heating of as little as one-fifth of the tank's capacity, and the fifth-wheel tachometer which, with the control of the pump speed, permits accurate application of the bituminous material. All of these features are described and illustrated in detail in Bulletin A-1940, which may be secured from the manufacturer by mentioning this text.

Excavator Controls That Feel the Load

Every shovel owner wants his shovel to operate more speedily and with less wear and tear on the shovel operator. The shovel operator himself wants to be able to feel the load on the crowd when he is working. This has been one of the objections to some of the newer methods provided for more easy operation of excavating equipment.

Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis., has answered these needs with a new low-pressure hydraulic control for P & H 3/8, 1/2 and 3/4-yard excavators. Each clutch or brake on these machines has its own master hydraulic cylinder, which operates it. The entire system is kept filled with oil by a central supply tank located at the proper level to maintain a full supply of oil in the system at all times. No booster pump is used for oil pressures so there is no loss of efficiency due to the foaming of the oil, no heating of the fluid due to constant pumping and the minimum chance for leakage.

Full information and operating diagrams will be found in Bulletin X-60 which Harnischfeger will send promptly to those mentioning this item.

Federal-Aid Funds Allotted to States

The sum of $156,000,000 has been apportioned among the 48 states, the District of Columbia, Hawaii and Puerto Rico for highway improvement and elimination of hazards at railroad grade crossings from appropriations authorized for the fiscal year beginning July 1, 1940. This apportionment was authorized by the Act of June 8, 1938, which provided $115,000,000 for improvement of the Federal-Aid system and its extensions through cities, $15,000,000 for improvement of secondary or feeder roads, and $30,000,000 for elimination of hazards at railroad grade crossings.

Expenditure of these sums will be under the supervision of the Public Roads Administration of the Federal Works Agency and in accordance with the Federal-Aid plan in operation since 1916. The initiative in the selection of projects rests, as usual, with the state highway departments which also prepare plans, let contracts, and supervise construction, all subject to Federal approval.

Announcement was also made of the apportionment of $2,000,000 to be expended in the thirteen public-lands states for construction of roads through public lands and Federal reservations.

The apportionment is as follows:

State	Regular Federal-Aid	Secondary or Feeder Roads	Grade Crossings	Total
Ala.	$ 2,380,349	$ 310,480	$ 589,270	$ 3,280,099
Ariz.	1,637,140	213,540	191,626	2,042,306
Ark.	1,955,081	255,011	510,125	2,720,217
Calif.	4,367,576	569,684	1,111,429	6,048,689
Colo.	2,080,133	271,322	376,426	2,727,881
Conn.	710,741	93,749	248,548	1,061,038
Dela.	560,625	73,125	146,250	780,000
Fla.	1,548,961	202,038	416,288	2,167,287
Ga.	2,885,623	376,386	733,109	3,995,118
Idaho	1,410,297	183,952	242,861	1,837,110
Ill.	4,650,696	606,612	1,544,707	6,802,015
Ind.	2,788,741	363,749	758,563	3,911,053
Iowa	2,915,122	380,233	819,207	4,114,562
Kans.	2,977,130	388,321	756,758	4,122,209
Ky.	2,093,355	273,046	534,074	2,900,475
La.	1,652,720	215,572	464,383	2,332,675
Maine	1,002,926	130,816	202,164	1,335,906
Md.	944,288	123,168	300,034	1,367,490
Mass.	1,580,826	206,195	610,114	2,397,135
Mich.	3,445,694	452,047	970,387	4,888,128
Minn.	3,101,454	404,538	783,436	4,289,428
Miss.	2,017,658	263,173	465,023	2,745,854
Mo.	3,430,445	447,449	890,471	4,768,365
Mont.	2,330,932	304,035	396,693	3,031,660
Nebr.	2,328,430	303,709	522,486	3,154,631
Nev.	1,442,071	190,705	146,250	1,799,026
N. H.	560,625	73,125	146,250	780,000
N. J.	1,520,740	198,357	584,751	2,303,848
N. M.	1,843,554	240,464	248,930	2,332,948
N. Y.	5,572,118	726,798	2,000,719	8,299,635
N. Car.	2,672,689	348,612	754,096	3,775,397
N. Dak.	1,755,204	228,940	462,007	2,446,151
Ohio	4,118,378	537,180	1,249,549	5,905,107
Okla.	2,671,591	348,468	685,148	3,705,207
Ore.	1,884,737	245,861	335,220	2,465,818
Penna.	4,853,536	633,070	1,690,736	7,177,342
R. I.	560,625	73,125	146,250	780,000
S. Car.	1,528,126	199,321	444,883	2,172,330
S. Dak.	1,851,590	241,512	401,477	2,494,579
Tenn.	2,391,758	311,968	559,502	3,263,228
Texas	7,163,707	934,397	1,630,426	9,728,530
Utah	1,294,360	168,829	193,595	1,656,784
Vt.	560,625	73,125	146,250	780,000
Va.	2,085,702	272,048	558,591	2,916,341
Wash.	1,809,062	235,965	450,343	2,495,370
W. Va.	1,245,713	162,484	391,518	1,799,715
Wis.	2,771,243	361,466	725,347	3,858,056
Wyo.	1,440,222	187,855	197,023	1,825,100
D. C.	560,625	73,125	146,250	780,000
Hawaii	560,625	73,125	146,250	780,000
P. R.	560,625	73,125	224,207	857,957
Total	$112,125,000	$14,625,000	$29,250,000	$156,000,000

Turnpike Progress Assures Early Use

At the close of 1939 the Pennsylvania Turnpike Commission reported that the construction of the 160-mile super-highway had provided nearly 10,500,000 man-hours of employment and almost $8,150,000 in wages. A total of 6,092 men were employed by the contractors and 1,097 by the Commission. This total, 7,189, represented a decline of about 50 per cent over the employment peak of 15,000 last fall, a peak which may be surpassed when paving operations are resumed about April 1.

During 1939 the Commission awarded 74 contracts with a total value of $46,090,100.33. Of these, 56 got under way with an average completion record of 69.8 per cent. The 39 grading and drainage contracts were on the average 92.5 per cent completed as of December 31. One 10-mile paving contract was substantially completed and several others were started. The six tunnel contracts were 36 per cent completed, but this figure does not give a true picture of progress, since nearly 50 per cent of the required tunnel work was done by the Old South Penn Railroad builders 55 years ago. This means that the tunnels, at year-end, were more than 70 per cent excavated to the Turnpike cross-section.

Rays Hill tunnel has been holed through and 75 per cent of the required footage in all the tunnels is now ready for concrete lining, leaving less than 8,000 of the original 34,200 feet to drill in full-face section and only about 250 feet of Old South Penn construction to widen in one tunnel.

The 153-foot Clear Ridge cut near Everett, Bedford County, is about 80 per cent completed, and the nearby Mount Dallas cut, over 100 feet deep, is about 95 per cent completed.

Paving was suspended last fall with about 14 miles of concrete placed, but 22 paving contracts have been awarded during the winter for an early start in the spring.

Theft-Proof Buttons For Reflector Signs

One of the features of Rubberlite reflector road signs is that the letters are made up complete with the reflector button embedded in rubber and containing a heavy metal inset. This makes it possible for a contractor or highway department to make signs on barricades or simply to attach these letters to an already existing non-reflecting sign.

The buttons are automatically at the right depth to give the maximum reflection and to protect them from easily being chipped off. This setting of the letters at the proper depth makes the definition of the letter clearer and there is no splash of light on the adjacent portion of the sign.

Rubberlite arrowheads with reflectors in both sides have a visibility of 3,000 feet and make excellent indicators for curves as they may be tipped according to the sharpness of the curve or they may be used on barricades to indicate detours. Complete information will be found in the literature of M. C. Almes, Cuyahoga Falls, Ohio, which will be furnished promptly to those mentioning this item.

1939 A.R.B.A. Proceedings Available to Non-Members

Released just before the 1940 Annual Convention of the American Road Builders' Association, the *Proceedings* of the 36th Annual Convention held in San Francisco, Calif., March 7-10, 1939, is now available to non-members of the Association at $10.00 a copy, from the Association headquarters at the National Press Building, Washington, D. C.

This 624-page volume presents papers, reports and discussions of the various divisions of the Association presented at the Convention and offers all highway engineers, municipal, county and state, a helpful reference volume on the present state of highway planning, design, construction and maintenance.

Protecting the abutment of an old steel bridge with Armco corrugated sheeting.

Corrugated Sheeting For Many Services

A new light-weight corrugated steel sheeting for trenches, cofferdams, bulkheads and cut-off walls has recently been announced by Armco Drainage Products Association, 703 Curtis Street, Middletown, Ohio. This corrugated sheeting is particularly economical for many locations where lighter gages are sufficient. Armco corrugated sheeting is made in three types, inter-locking, clip and flanged, and the units are of such size and weight as to be handled easily. The sheeting runs 14 and 12 inches wide and the maximum length is 18 feet so that two men can easily carry and handle one unit.

This corrugated sheeting comes in 12, 10 and 8-gage, making it sufficiently strong for all normal service conditions. It can be pulled readily and used over and over at low unit cost per job. For permanent installations it is dip galvanized. The units can be nested and require a minimum storage space on the job or in the yard, and this also simplifies hauling.

Truck Grader Patrol Operates Year-Round

An underbody, hydraulically-controlled moldboard with an 8-inch pitch adjustment and quickly reversible from the driver's seat, was the feature of the Hi-Way Service Corp. exhibit at the Road Show. Mounted on an Oshkosh 4-wheel drive truck, this 10 to 14-foot moldboard of 1¾-inch high carbon steel, 14 inches high with a standard ⅝ by 6-inch cutting edge, can be pressed close to the road surface by the two double acting hydraulic rams for ice work or for heavy cutting on road maintenance.

The rear push frame, which is a structural A frame of 4 x 3 x ⅝-inch angles, is cross-braced and hinged under the rear axle of the truck, giving a sturdy push to the moldboard at its center. One of the most effective features of this combination of the Drott Truck Grader Patrol, mounted on the Oshkosh truck, is that the truck is sufficiently powerful to handle a V-plow in front and at the same time operate the grader blade beneath to remove ice close to the pavement.

Complete information regarding the Drott Grader Patrol may be secured from the Hi-Way Service Corp., Milwaukee, Wis., by mentioning this item.

Selecting the Truck To Fit Your Own Job

The Dodge Division, Chrysler Corp., Detroit, Mich. has taken an important step in its sales policy. Truck owners and operators want a truck to fit the job and to make this possible with its 1940 line of six different capacities ranging from ½-ton to 3-ton Dodge diesel trucks, a special job-rating system has been set up.

In order to make the proper selection of trucks, the purchaser is asked to fill in a short questionnaire which shows the requirements of the hauling jobs he has handled including the capacity of the light-duty and heavy-duty trucks now used with their wheelbase, body type and gear ratio, the kind of materials hauled and the general hauling conditions. The following pages of the pamphlet contain the specifications of each of the Dodge trucks, making it possible for the prospective purchaser to select from this group of trucks the model best suited to his operating conditions. The tables and general data included are of great help in recommending the right truck. Each owner is counselled that these can only point the way toward the intelligent study of each individual situation. Road conditions, load variations, special body requirements, operating schedules and even such things as altitude, influence the model of truck and equipment that will do the best job.

The last inside page of the pamphlet furnishes space for the final quotation by the dealer on a specific type of Dodge Job-Rated truck which will best fit the owner's hauling problem. Copies of this pamphlet, "Dodge Job-Rated Trucks—A Proposal And Recommendation," may be secured free on request by mentioning this item.

Bending Steel Pipe By "Wrinkle" Method

A booklet describing the recently perfected wrinkle-bending method for bending steel pipe has been announced by the Linde Air Products Co., unit of Union Carbide & Carbon Corp., 30 E. 42nd Street, New York City. This process is finding wide application, particularly in the installation of cross-country pipe lines, or wherever steel pipe must be tailored to fit.

The method is to heat a narrow band about half-way around the pipe at the point where a change of direction is desired, using an oxy-acetylene flame. When the band has reached a red heat, the pipe is bent mechanically with the heated portion at the inside of the bend. This causes a slight upsetting of the heated metal and produces a change of direction of from 4 to 6 degrees. When greater changes in direction are required, a series of wrinkle bends result in a smooth, long sweep bend of any desired angle. The upset metal projects outward from the inside of the bend, thus not interfering with the flow of fluid through the pipe and without restricting the diameter at the bend.

The wrinkle-bending process is fully described in a 4-page booklet, entitled "Wrinkle Bending" which is available to readers of this magazine from Linde by mentioning this item.

Cummins Offers Warranty

Announcement has been made by the Cummins Engine Co., Columbus, Ind., of a new warranty policy which became effective March 1. Under the terms of this warranty, the company guarantees its diesel engines for 100,000 miles or one year.

Cummins is the first diesel engine manufacturer to offer such a warranty, and states that it is able to do so because of the actual engine performance records covering the past seven years in the widest variety of services. In addition, it is claimed that precision manufacturing methods and the use of new and improved materials assure longer engine life and greater operating efficiency.

Engine-Compressor Made From Ford V-8

By a patented construction, Schramm, Inc., West Chester, Pa., has developed the new Model 55 Schramm Fordair compressor, consisting of a standard 8-cylinder Ford V-8 block with four cylinders converted to air compression and the other four cylinders still used as power cylinders. In each bank of cylinders there are two compression and two power cylinders. Each compressor cylinder has a poppet-type valve, mechanically operated from the cam shaft. Unloading is accomplished by holding the intake valve open by air pressure, while each intake is protected by an oil bath-type air cleaner. Double size long life discharge valves are located in the head directly over the cylinders. All models are equipped with an automatic engine slow-down reducing the speed during the unloading period, and increasing the speed before loading starts, thus conserving fuel and reducing engine wear. There are two models, the 55 and the 105 Fordair, the compressor parts of which, including valves, are all interchangeable.

By placing one of these units under the hood of a Ford V-8 truck, the truck becomes both an air compressor as well as a truck. This same idea has been applied to several other self-propelled outfits utilizing the Ford V-8 engine, such as railroad motor cars and small crawler compressor units. The use of the combined truck and compressor will allow many counties to buy compressors that ordinarily would not feel that they could afford them, and they make excellent extra service units for state highway maintenance departments.

Complete information on these compressors will be found in Bulletin 3915 which Schramm, Inc., will be glad to send to readers of CONTRACTORS AND ENGINEERS MONTHLY.

Directory of EQUIPMENT DISTRIBUTORS

The following cards (arranged by states) show the names of dealers in contractors' equipment and supplies, with a record of various lines handled.

TRACTOR & MACHINERY CO., INC.

351 Whitehall St., S.W., Atlanta, Ga.

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CHAMPION Rock Crushers
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Universal Crusher Company

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1402 North 19th Ave., P. O. Box 1494,

Phone 3-1146, Phoenix, Ariz.

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BROOKVILLE Locomotives
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BUCYRUS-ERIE Shovels
BUFFALO-SPRINGFIELD Rollers
CLETRAC Tractors
CLEVELAND Rock Drills
EAGLE Crushers
EMSCO Road Equipment
GAR WOOD (Isaacson) Bulldozers, etc.
KEWANEE Conveyors
SCHRAMM Compressors
SOUTHWEST WELDING & MFG. CO.
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W. E. GRACE MFG. CO.—Road Sweepers
HANSON CLUTCH & MACHY. CO.—Full Revolving Shovels, Cranes, Draglines, ⅜, ½, ⅝, and ¾-yd.
LE ROI CO.—Gasoline Power Units and Parts
MASTER VIBRATOR CO.—Gas, Elec. Generator Sets, Conc. Vibrators, Power Tools
MINN. BTL. & MACHY. CO.—Twin City Engines, parts
NORTHERN CONVEYOR CO.—Stationary & Portable Conveyor Units
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SNOW REMOVAL EQ. CO.—Rotoblade & Sierra Snow Plows
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Butler Bins, Batchers, Bulk Cement Plants
"Caterpillar" Tractors, Graders, Power Units, etc.
Cedar Rapids Crushers
Clyde Hoists
Convery Kettles, Tools
Davey Compressors
Dempster Quarry Skips
Burex Saw Rigs
Ingersoll-Rand Air Compressors, Air Tools
Jackson Vibrators
Kilefer Rippers, Harrows, Drag Scrapers, Plows
Kinney Asphalt Distributors
LaPlant-Choate Bulldozers, Trailbuilders, Tamping Rollers
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Page Dragline Buckets
Red Edge Shovels
Red Star Wheelbarrows, Concrete Carts
Rex Mixers, Pumps, Pavers
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"CATERPILLAR"—Tractors
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PAGE—Dragline Buckets
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TRACKSON—Crawlers, Shovels and Bulldozers
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Ingersoll-Rand Co.—Air Compressors, Pneumatic Tools
Iowa Mfg. Co.—Crushers, Conveyors & Asphalt Plants
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Chain Belt Company
Clyde Iron Wks., Inc.
Chicago Pneumatic Tool Co.
General Excavator Co.
Jackson Mfg. Co.
Manitowoc Engineering Works
Master Vibrator Company
Rogers Brothers Corp.
Sauerman Brothers, Inc.
Stephens-Adamson Mfg. Co.
Van Dorn Electric Tool Co.
Vulcan Iron Works

Member: Associated Equipment Distributors

NORTH CAROLINA EQ. CO.

Raleigh Statesville

Asroil Burner Company
American Cable Company
Barco Mfg. Co.
Buckeye Traction Ditcher Company
Bucyrus-Erie Tractor Eq.
Cleaver-Brooks Company
Electric Tamper & Eq. Co.
Elgin Corporation
Euclid Road Machy. Co.
Fairbanks, Morse & Co.
Fairfield Engrg. Co.
Four Wh. Dr. Auto Co.
Frank G. Hough Co.
Gallion Allsteel Body Co.
Gallion Iron Wks. & Mfg. Co.
Good Roads Mach. Corp.
Heltzel Steel Form & Iron Company
Highway Trailer Co.
Ingersoll-Rand Company
Internat'l Harvester Co.
Iowa Manufacturing Co.
Jaeger Machine Company
Jeffrey Manufacturing Co.
Jos. F. Kiesler Company
Kensington Steel Company
Municipal Supply Co.
Northwest Engineering Co.
Page Engineering Company
Rogers Bros. Corp.
The C. S. Johnson Co.
Wellman Engineering Co.

Member: Associated Equipment Distributors

GASH-STULL CO.

Chester Pennsylvania

Representing

ANTHONY COMPANY
FORD Tractors and Equipment
FORDSON Tractors and Equipment
MICHIGAN Power Shovels
OSGOOD COMPANY
SCHRAMM, INC.
TRACKSON COMPANY

HOISTS—SCRAPERS—WIRE ROPE

MANGANESE DIPPER TEETH

WESTERN MATERIAL CO.

Aberdeen, Sioux Falls, Rapid City, S. D.

Allsteel Prod.—Pipelines
Athey—Wagons
Balderson—Snow Plows
Barnes—Pumps
Bates—Wire Ties
Blackhawk—Indus. Jacks
Broderick & Bascom—Rope
Butler—Bins, Hoppers
Philip Carey—Exp. Joint
"Caterpillar"—Equipment
Chain Belt—Pumps, Mixers
Clyde—Hoists
Conc. Surfacing—Surfacers
Coffing—Hoists
D-A—Lubricants
Davey—Compressors
Day—Crushers
Grace—Road Sweepers
H'wy Safety—Refrac. Markers
H'way Trailer—Earthboring Eq.
Killefer—Road Equipment
Koh—Spreaders
LaPlant-Choate—Tractor Eq.
LeTourneau—Dirt-Moving Eq.
Littleford—Markers, etc.
LeRoi—Gas Engines
Manhattan—Belting
Rockwood—Pulleys
Rotary—Snow Plows
Saugen—Derricks
Sauger-McLean—Scrapers, Fresnos
Speeder—Shovels
Sterling—Wheelbarrows
Surestop—Traffic Signs
Templeton-Kenly—Jacks
Universal—Crushers
Wej-Loc-Su—Guard Rail Eq.
Western Cataphote—Signs
Wiard—Plows
Willamette Hyster—Winches
Winslow—Scales
Wood—Shovels

Member: Associated Equipment Distributors

CONSTRUCTION EQUIPMENT CO.

1118-1124 Ide Ave., Spokane, Wash.

Asroil Burner Co., Inc.
Archer Iron Works
Bates Wire Ties
Beebe Bros.
Blystone Mfg. Co.
Broderick & Bascom Rope
Bucyrus-Erie Co.
Buffalo-Springfield Roller Co.
Butler Bin Co.
Chain Belt Co.
Climax Eng. Co.
Concrete Surf. Machy. Co.
D-A Lubricant Co.
Detroit Graphite Co.
R. E. Dietz Co.
Duff-Norton Mfg. Co.
Fairbanks, Morse & Co.
Fate-Root-Heath Co.
Homestead Valve Mfg. Co.
Kalamazoo Ry. Supply Co.
LeRoi Co.
The Linde Air Products Co.
M. & M. Wire Clamp Co.
Mall Tool Co.
Niagara Mfg. Co.
Red Star Products Co.
Saugen Derrick Co.
Sheldon Mfg. Co.
Sterling Machinery Corp.
Sterling Wheelbarrow Co.
Sullivan Machinery Co.
Sunbeam Mfg. Co.
Templeton, Kenly & Co.
Willamette Hyster Co.
"Williams" Buckets, etc.
Young Iron Works

Member: Associated Equipment Distributors

CAROLINA TRACTOR & EQUIPMENT COMPANY

S. Main Ext. Salisbury, N. Car.

Branch Office and Warehouse:
Raleigh, N. C.

ATHEY Track-wheel Wagons
BARBER-GREENE Conveyors, Car Unloaders
BLAW-KNOX Steel Forms, Bins, Buckets, Trukmixers
CATERPILLAR Tractors, Graders, Power Units
C.M.C. Mixers, Pumps, Hoists
DIAMOND Roll, Jaw Crushers
ETNYRE Bituminous Distributors, Flushers
GARDNER-DENVER Air Compressors, Drills
HUBER Rollers
JAHN Machinery Trailers
LaPLANTE-CHOATE Wagons, Bulldozers
LeTOURNEAU Carry-all Scrapers
RUSSELL Wheelers, Rippers, Fresnos
THEW Shovels, Cranes

Member: Associated Equipment Distributors

EDELEN & BOYER COMPANY

Office and Warehouse Philadelphia
236 North 23rd St. Penna.

Distributors of

Adnun Stone Spreaders
Adnun Black Top Pavers
Asroil Heaters, Melting Pots
Archer Towers, Buckets
"Cletrac" Tractors
CMC Master Mixers, Saw Rigs
CMC Self-Priming Pumps
Flex-Plane Finishing Machine
Hayward Clamshell Buckets
Heltzel Finishing Mach.
Heltzel Steel Forms, Bins
Jackson Wheelbarrows, etc.
LaCrosse Tu-Way Trailers
Lidgerwood Hoists
Marsh-Capron Mixers
Miles Block Machines
Multi Foots Pavers
New Haven Burlapped-Cotton Blankets
Pulsometer Steam Pumps
Ransome Tr. Mixers, Agitators
R-B Finegrader
Saugen Derricks, etc.
Sullivan Portable Air Comp.
Tru-lay Steel Cable
Union Pile Hammers
White Vibrators
Wonder Concrete Mixers

NIXON-HASSELLE COMPANY, INC.

Contractors' Equipment

Chattanooga Tennessee

Representing

Archer Towers, Spouting Equipment
Austin-Western Graders, Crushers, Rollers, Scrapers, etc.
Barber-Greene Loaders, Conveyors, etc.
Blaw-Knox Batchers, Buckets, Forms, etc.
Brea Tank Car Heaters, etc.
Bucyrus-Erie Bullgraders, etc.
Dobbie Derricks
Four Wheel Drive Trucks
Hough Road Sweepers, Sprinklers, etc.
Ingersoll-Rand Compressors, Jackhammers, Air Tools, etc.
International TracTractors, Wheel Tractors & Power Units
Jahn Machinery, Trailers
Lidgerwood Hoists, etc.
Maslead Asphalt Kettles
Mall Vibrating Equipment, Saws, etc.
Newport Culvert Pipe
Northwest Cranes, Shovels
Rex Mixers, Pavers, Pumps, etc.
Timken Detachable Bits
Vulcan Gas Locomotives

Also Wheelbarrows, Carts, Benders, Cutters, Shovels, etc.
Member: Associated Equipment Distributors

BOEHCK EQUIPMENT CO.

2404 W. Clybourn St. Milwaukee, Wis.

Representing

American Hoist & Derrick Co.
Byers Machine Co.
Corrugated Steel Sheet Piling Corp.
Electric Tam. & Equip. Co.
Hauck Mfg. Company
Hercules St. Products Co.
Homestead Valve Mfg. Co.
Iowa Manufacturing Co.
Independent Pneumatic Tool Co.
Jaeger Machine Co.
C. S. Johnson Company
Jones-Superior Machine Co.
Lambert Automatic Skip Co.
LeRoi Co.
A. Leschen & Sons Rope Co.
Lima Locomotive Works
McKiernan-Terry Corp.
Portable Machinery Company
Red Star Products, Inc.
Saugen Derrick Co.
Superior Concrete Accessories, Inc.
Wellman Engineering Co.

Member: Associated Equipment Distributors

THE CLETRAC OHIO SALES CO.

E. 193rd Street and Euclid Ave.
Cleveland Ohio

Representing

THE BAKER MFG. CO.—Power Scrapers
THE CLEVELAND TRACTOR CO.—Crawler Tractors, Front End Loaders
THE DAVEY COMPRESSOR CO.—Air-Cooled Compressors
THE EUCLID ROAD MACHY. CO.—Crawler Wagons, Scrapers, Bulldozers
THE HEIL CO.—Power Scrapers, Bulldozers & Trailbuilders
THE ISAACSON IRON WORKS—Power Scrapers, Trailbuilders
MAIN STEEL PRODUCTS CO.—Snow Plows
MEAD MORRISON—Winches
GAR WOOD INDUSTRIES, INC.—Trailbuilders, Bulldozers

GILES & RANSOME

17th St. & Sedgley Ave., Philadelphia

Athey Truss Wheel Co.—Crawler Wagons
Barnes Mfg. Co.—Centrifugal Diaphragm and Force Pumps
Blaw-Knox Co.—Clamshell Buckets, Road Forms, Material and Cement Bins
"Caterpillar"—Tractors and Road Machinery
Davey—Air Compressors
R. G. LeTourneau, Inc.—Carryalls, Buggies
Master—Elec., Gas. Concrete Vibrators
Northwest Engineering Co.—Gasoline Cranes, Shovels and Draglines
Ord—Road Finishing Machine
Ransome Concrete Machinery Co.—Concrete Mixers and Appliances

Member: Associated Equipment Distributors

BROOKS EQUIP. & MFG. CO.

Knoxville 408 Davenport Rd. Tennessee

Representing

J. D. Adams Co.
Buckeye Traction Ditcher Co.
Bucyrus-Erie Co.
Burch Corp.
Cincinnati Rubber Mfg. Co.
Continental Roll & Steel Co.
Crucible Steel Co.
Davey Compressor Co.
Drave-Doyle Co.
Heltzel Steel Form & Iron Co.
Frank G. Hough Co.
Hug Co.
Independent Pneu. Tool Co.
International Harvester Co.
Jaeger Machine Co.
C. S. Johnson Co.
Linn Mfg. Corp.
McKiernan-Terry Corp.
N. P. Nelson Iron Works
Owen Bucket Co.
Pioneer Engrg. Wks., Inc.
Rosco Mfg. Co.
Upson-Walton Co.
Viber Co.

Member: Associated Equipment Distributors

CUNNINGHAM-ORTMAYER CO.

429 W. Michigan St. Milwaukee, Wis.

Allen Road Maintainers
Blaw-Knox Truck Mixers
Butler Bins, Batchers
C.H.&E. Pumps, Hoists, Saw Rigs
Case Tractors and Mowers
Cleveland Formgrader Paving Tools
DRAKE-WILLIAMS-MOUNT Dragline Buckets
Eagle Crushers
Flexible Road Joint Machines
Flexible Sewer Cleaning Equipment
GALION IRON Graders, Rollers and Spreaders
Good Roads Snow Plows
HANDLAN 100-Hour Lantern, Torches
Heltzel Steel Road Forms
Ingersoll-Rand Air Compressors, Tools
Insley Power Shovels, Cone. Towers & Buckets
Keebring Conc. Mixers, Cranes, Shovels, etc.
Kwik-Mix Conc. Mixers
Littleford Distributors, Tar Kettles, Heaters
Multiplex Conc. Block Eq.
Owen Clamshell Buckets, Grapples
Pansche Spray Painting Equip.
Parsons Trenchers
Reeth Conc. Vibrators
Tuthill Hwy. Guard Rail
Wonzel Tarpaulins
Whirlwind Power Lawn Mowers
Wire Rope Corp of America
Wockridge Scrapers

Member: Associated Equipment Distributors

W. T. WALSH EQUIPMENT CO.

3088 West 106th St., Cleveland, Ohio Tel. Clearwater 4400

Allis-Chalmers—Tractors
Anthony—Dump Bodies
Baker Mfg. Co.—Bulldozers
Broderick & Bascom—Wire Rope
Cleveland Rock Drill Co.—Air Tools
Construction Machy. Co.—Mixers
Foote Company—Pavers
Herculoy—Rollers
Hough—Tractor Front End Loaders
The G. S. Johnson Co.—Bins
LaCrosse—Trailers
McKiernan-Terry Corp.—Pile Hammers
Michigan—Power Shovels
Nelson—Bucket Loaders
Novo Engine Co.—Engines, Light Plants, Pumps
R-B Equipment Co.—Finegraders
Rosco Mfg. Co.—Distributors & Oilers
Schramm, Inc.—Air Compressors
The T. L. Smith Co.—Truck Mixers
Tiebolt—Bits
Wellman Engineering Co.—"Williams" Buckets
Gar Wood—Continental—Scrapers
Wm. Bros Mfg. Co.—Tamping Rollers

Member: Associated Equipment Distributors

HOWARD W. READ CORP.

800 N. Delaware Ave., Philadelphia, Pa.

Distributors

Ralph B. Carter Co.
Geo. Haiss Mfg. Co.
Ingersoll-Rand Co.
Insley Mfg. Co.
Koehring Co.
Quick-Way Truck Shovel Mfg. Co.
Vulcan Iron Works, Inc.—Pile Hammers

Also Carry in Stock:

Hoisting Engines, Gas and Steam

WILSON-WEESNER-WILKINSON CO.

Nashville Tennessee

Representing

Allis-Chalmers Mfg. Co.
Ames Baldwin Wyoming Co
Baker Mfg. Co.
Blaw-Knox Co.
Cleaver-Brooks Co.
Clyde Iron Works, Inc.
E. D. Etnyre Co., Inc.
Gorman-Rupp Co.
Ingersoll-Rand Co.
Insley Mfg. Co.
Koehring Co.
Littleford Bros.
Master Vibrator Co.
The Parsons Co.
Smith Engineering Works
Gar Wood Indus., Inc.

NASHVILLE—KNOXVILLE

Warehouse Stocks of Service

Reinforcing Steel and Mesh

Member: Associated Equipment Distributors

DROTT TRACTOR CO., Inc.

3841 W. Wisconsin Ave.

Milwaukee Wisconsin

Representing

ALLIS-CHALMERS Tractors, Graders, Speed Patrols, Hauling and Power Units
OSHKOSH 4-Wh.-Drive Trucks & Earth Movers, 4-Wh. steer, 4-Wh. drive
PIONEER Gravel and Rock Crushing Equipment
WAUSAU Snow Plows
LACROSSE Trailers
GENERAL MOTORS DIESEL Packaged Power Units
KOB Sand Spreaders
HERCULES Road Rollers
RUSSELL Scrapers, Plows
HOUGH Loaders, Sweepers
JOY Snow Loaders
GAR WOOD Dirt Moving Scrapers
DROTT Angledozers, Bulldozers, Scrapers, Scarifiers, Snow Plows, Hydraulic Equipment, etc.

Member: Associated Equipment Distributors

Contractors and Engineers Monthly

The road of tomorrow is the subject for considerable thought and speculation on the part of engineers, road builders and many others. At left is a "road of tomorrow"—part of the Ford Motor Co.'s exhibit at the New York World's Fair.

One of the fleet of giant 25-cubic yard White dump trucks, used at Shasta Dam, discharging its load over an embankment. These trucks, which weigh 20 tons empty, are powered by butane gas. See page 41.

Right, a glimpse into the future of our highways as visualized by Norman Bel Geddes for the General Motors Futurama at the New York World's Fair. These multi-lane super-highways are designed for safe travel at 50, 75 and 100 miles an hour. See page 16.

C. & E. M. Photo

Intensive activity on Section 106A of the North Metropolitan Sewer with a drop pile-driving foundation piles, a Browning crane removing the hand-excavated muck around tops of the piles, and a Jaeger truck-mixer pouring the mat. See page 5.

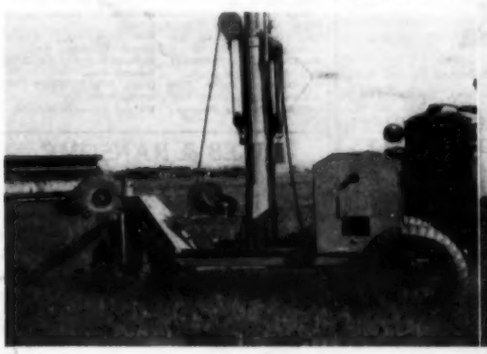
Grading operations on the Jacobson & McKinley subcontract on Contract 43, Section 12A, of the Pennsylvania Turnpike. See page 2.

C. & E. M. Photos

One of the features of the several grading jobs carried on by the Western Contracting Co. of Sioux City, Iowa, last summer, was the special equipment for keeping the jobs running smoothly and at top speed. Here are end and side views of a portable telescoping floodlight unit for night work. See page 24.

C. & E. M. Photos

At right, Jacobson & McKinley used rooters to break up the disintegrated shale for the scrapers on its Pennsylvania Turnpike subcontract. See page 2.



At left, a batch truck plays leap frog with the R-B subgrader on a J. R. Griffith Co. 7.63-mile concrete-paving contract between Janesville and Edgerton, Wis., last summer. Right, pouring 20-foot concrete slab with a Koehring 34-E paver on the Griffith job. See page 11.

C. & E. M. Photos